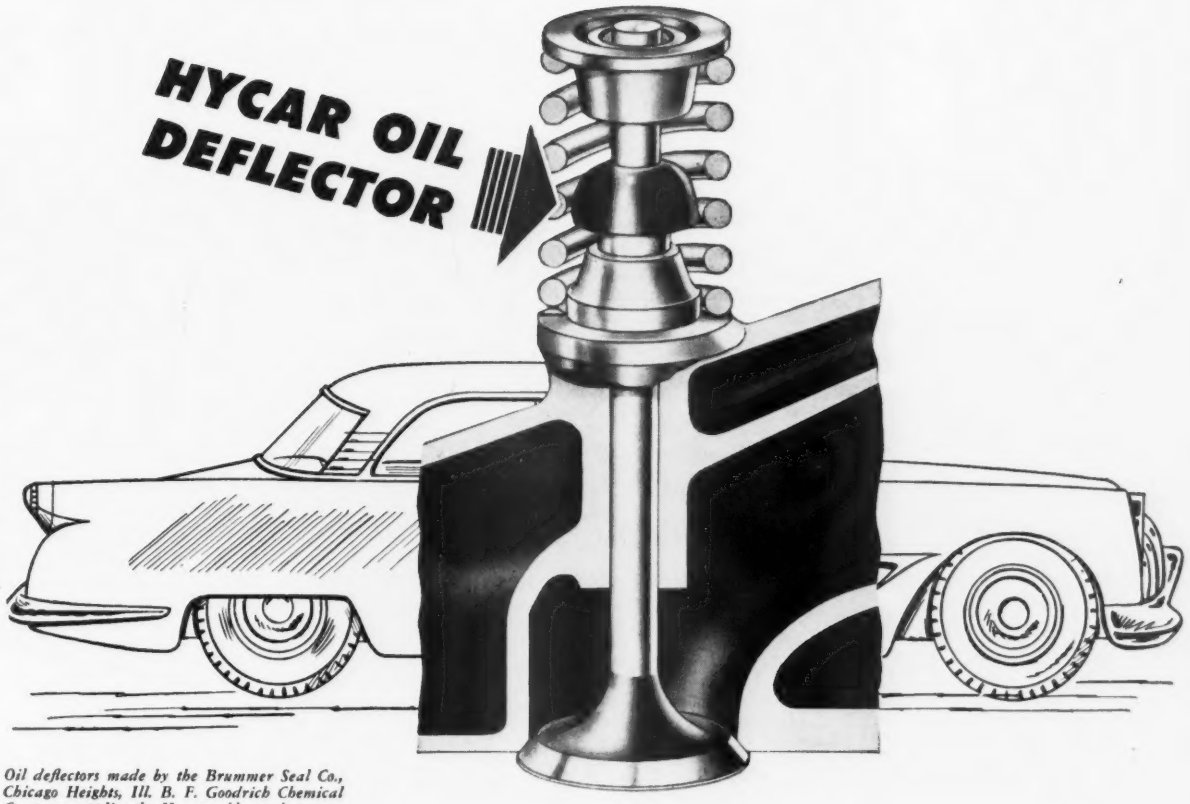
Another new development using

B. F. Goodrich Chemical *raw materials*



Oil deflectors made by the Brummer Seal Co., Chicago Heights, Ill. B. F. Goodrich Chemical Company supplies the Hycar rubber only.

DESIGN IMPROVEMENT IN OVERHEAD VALVE ENGINES

HERE'S an idea that eliminated a major cause of sparkplug fouling in overhead valve engines. A flexible umbrella-like part was designed that prevents oil from running down the valve stem into the combustion chamber. But one big problem was to find a material that keeps its strength and flexibility when drenched with hot oil for long periods. Hycar American rubber was the answer! It was the only material of many tested that withstood the tough operating conditions.

Molded from Hycar, the oil-wet deflectors are subject to temperatures above 200° F. during engine operation and below 0° F. in winter. The deflectors showed practically no deterioration after thousands of hours in actual road tests.

This new use for Hycar American rubber may give you an idea for solving a difficult design problem where severe operating conditions must be met. Parts made from Hycar—such as O-rings, seals, gaskets, etc.—are ideal for many applications requiring exceptional resistance to oil, abrasion and high temperature aging. For information, please write Dept. HB-9 B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

Hycar
American Rubber

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON colors

E for Excellence

The trend to *Performance* with a capital "P" in new model cars probably explains in part the upsurge of interest we see in our Philblack* E.

Surely our Super Abrasion Furnace black is the answer to tire men's prayers for a top line tread that will take it when Leadfoot Louie puts the spurs to all those brand-new horses under the hood.

Furthermore, even the daintiest Miss or Mrs. can now bear down on the stopper pedal like a beefy trucker, thanks to power brakes.

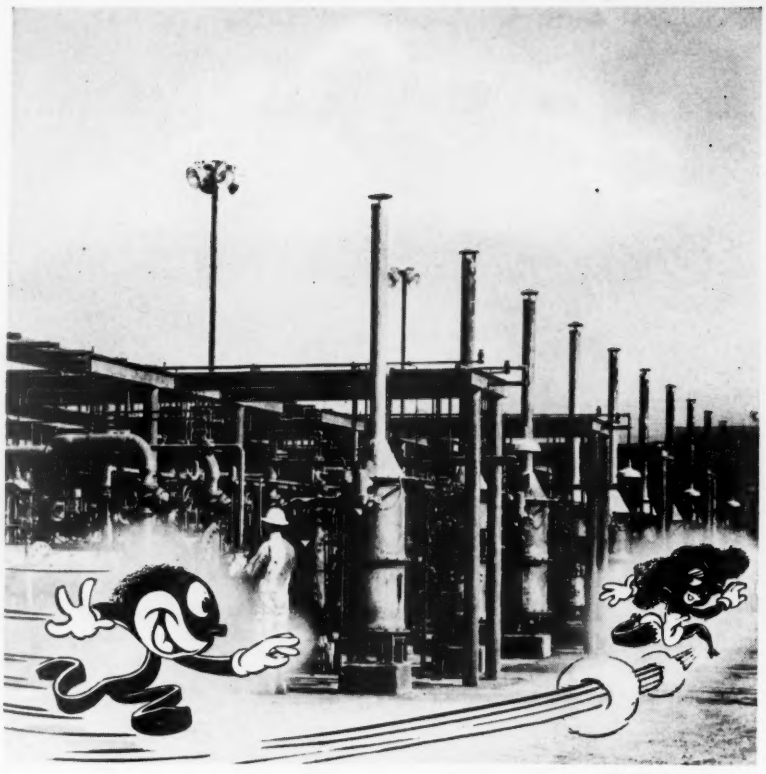
With this in mind it is worth noting that:

A. Passenger tire tests show Philblack E to be 35 to 43% superior to HAF black in GR-S-1500 tread stocks.

B. In natural rubber truck tires, Philblack E is 12 to 24% superior to EPC black. Also, the exceedingly good resistance to chipping, cutting and cracking conferred by Philblack E greatly extends the life of big tires in rugged service which often fail before they are worn smooth.

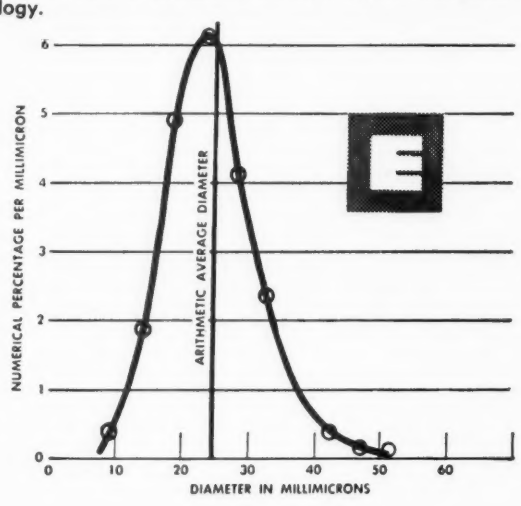
For that new nylon cord tire with all the extras – specify Philblack E. Our representatives will be glad to give you all possible technical assistance.

*A Trademark



Philblack E reactor furnaces, above, represent one of the great advances in furnace black technology.

Extremely small particle size of Philblack E is evident in this chart (right). A wide range of physical properties can be obtained by varying Philblack E and softener levels. Your Philblack technical representative can help you choose black and softener levels to yield stocks of desired processability, tensile, hysteresis and hardness, all with excellent abrasion resistance.



Know the Philblacks! KNOW WHAT THEY'LL DO FOR YOU!

A **Philblack A FEF Fast Extrusion Furnace**
Ideal for smooth tubing, accurate molding, satiny finish. Mixes easily. High, hot tensile. Disperses heat. Non-staining.

I **Philblack I ISAF Intermediate Super Abrasion Furnace**
Superior abrasion resistance at moderate cost. Very high resistance to cuts and cracks. More tread miles at high speeds.

O **Philblack O HAF High Abrasion Furnace**
For long, durable life. Good electrical conductivity. Excellent flex. Fine dispersion.

E **Philblack E SAF Super Abrasion Furnace**
Toughest black on the market. Extreme abrasion resistance. Withstands aging, cracking, cutting and chipping.

Phillips 66

PHILLIPS CHEMICAL COMPANY, Philblack Sales, 318 Water Street, Akron 8, Ohio. Export Sales: 80 Broadway, New York 5, N. Y. West Coast: Harwick Standard Chemical Company, Los Angeles, California. Canada: H. L. Blachford, Ltd., Montreal and Toronto.

FIRST all-decyl phthalate (introduced by Cabot in July, 1952) **STILL FIRST IN QUALITY**

Cabflex® DDP

CABOT's di-decyl phthalate

Compare Cabflex® DDP with higher priced polymeric plasticizers

- Cabflex® Di-OP
  di-iso-octyl phthalate
  standard primary plasticizer
- Cabflex® DOP
  di-2-ethylhexyl phthalate
  standard primary plasticizer
- Cabflex® ODP
  iso-octyl decyl phthalate
  improved flexibility permanence in vinyl compounds
- Cabflex® DDP
  di-decyl phthalate
  high molecular weight diester imparting remarkably low volatility
- Cabflex Di-OA®
  di-iso-octyl adipate
  standard low temperature plasticizer
- Cabflex® DOA
  di-2-ethylhexyl adipate
  standard low temperature plasticizer
- Cabflex® ODA
  iso-octyl decyl adipate
  improved low temperature permanence in vinyl compounds
- Cabflex® DDA
  di-decyl adipate
  low temperature diester with low volatility and high efficiency
- Cabflex® Di-OZ
  di-iso-octyl azelate
  low volatility, good water immersion properties impart excellent low temperature permanence
- Cabflex Di-BA®
  di-iso-butyl adipate
  nontoxic, approved for use in vinyl food wrappings by Food & Drug Administration
- Cabol 100
  hydrocarbon oil plasticizer
  low cost plasticizer, with plasticizer efficiency of 1.5; up to 50% compatibility with octyl-phthalate type plasticizers

	Cabflex® DDP	Polymeric Plasticizers #1	#2	#3
SPI Volatility % Loss 24 hours at 90°C. (2 / 0)	1.1	0.49	0.80	1.3
Water Extraction (Method of E. F. Schulz) % Loss 6 days at 85°C. (8 / 0)	0.9	2.5	6.5	5.0
Clash & Berg T_f — °C. (0 / -25)	-24	-6	-11	-19
Pound Volume Cost — ¢ (70 / 30)	30.8	64.4	51.2	38
Parts to give Equivalent 100% Modulus (75 / 50)	54.5	70	67	56

All tests run at an equivalent 100% Modulus

Cabot makes the Cabflex® DDP, but not the finished product

For samples and for further technical information address

CABOT PLASTICS CHEMICALS DIVISION

GODFREY L. CABOT, INC. 77 Franklin St., Boston 10, Mass.

ELECTRICALLY INTERCHANGEABLE

and it dry blends, too—new PLIOVIC EDB90V

HERE'S electrifying news for wire coverers and other users of vinyl resins in applications where insulative properties are important. It's PLIOVIC EDB90V —the first of Goodyear's new series of electrical grade resins approved on an interchangeability basis.

PLIOVIC EDB90V is a straight polyvinyl chloride resin. But it's tailor-made with three specific aims in mind. The first is to give you a resin of approved electrical quality. The second is to give you a resin that is truly easy to extrude using a dry blend process. The third is to give you both these advantages with no sacrifice in physical properties.

PLIOVIC EDB90V easily passes the tests required by Underwriters' Laboratories, Inc., including the T and TW Building Wire Specifications and the 80°C. and 105°C. Appliance Wire Specifications. It is fully interchangeable with all other approved electrical grade vinyl resins. It dry blends readily into a smooth, free-flowing mix. It extrudes and calenders well. And it possesses excellent physical properties.

The primary reason for the unique combination of properties in PLIOVIC EDB90V is careful polymerization. Particular attention is paid to the close control of molecular weight and particle size, shape and distribution. Extra effort also is exerted to eliminate impurities. This is the same care and control that characterize the production of all PLIOVIC resins, developed to a much finer degree.

PLIOVIC EDB90V is new, but not untried. It has been fully proved—and approved —in exhaustive tests and trial plant runs. Why not prove it in your plant? Samples and top technical help on it and other new, electrical grade resins are yours by writing to:

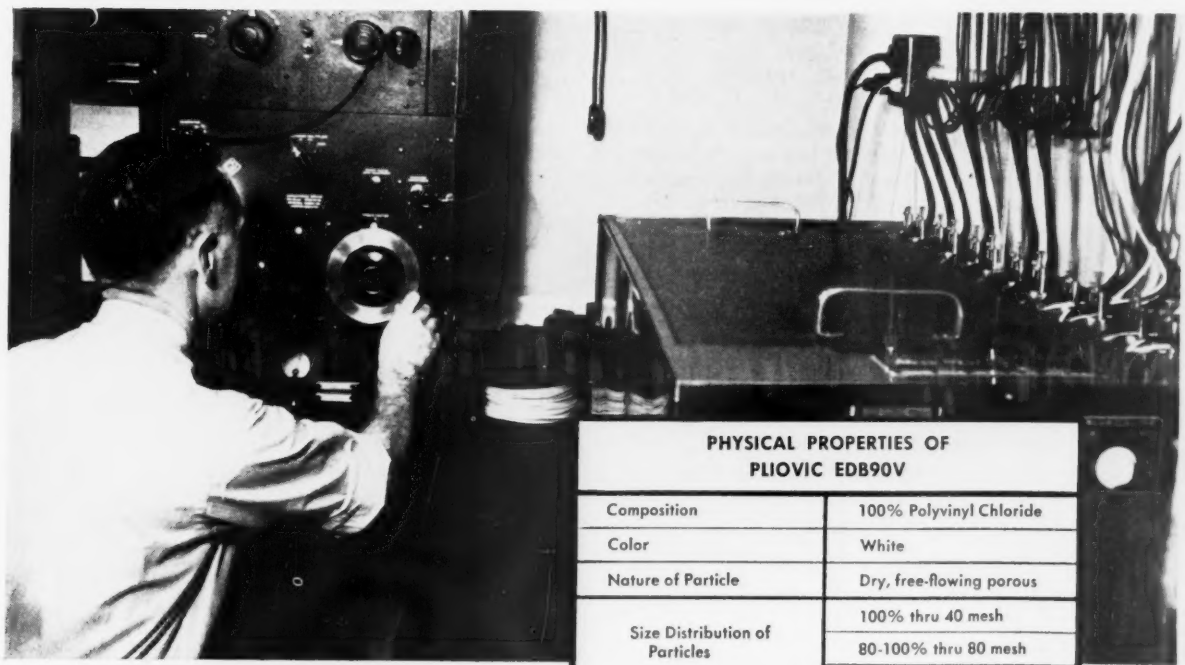
Goodyear, Chemical Division, Akron 16, Ohio

CHEMICAL GOODYEAR DIVISION

Chemigum, Pliobond, Pliolite, Plio-Tuf, Pliovic—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

Use-Proved Products—CHEMIGUM • PLIOBOND • PLIOLITE • PLIO-TUF • PLIOVIC • WING-CHEMICALS—The Finest Chemicals for Industry

PLIOVIC EDB90V successfully passed rigorous tests such as these – Insulation Resistance Test (above) and Dielectric Constant Test (below)—to be declared fully interchangeable with all other approved, electrical grade, vinyl resins by Underwriters' Laboratories, Inc.



PHYSICAL PROPERTIES OF PLIOVIC EDB90V

Composition	100% Polyvinyl Chloride
Color	White
Nature of Particle	Dry, free-flowing porous
Size Distribution of Particles	100% thru 40 mesh
	80-100% thru 80 mesh
	0-15% thru 200 mesh
Intrinsic Viscosity	0.90 Av.
Specific Gravity	1.40 Av.
Bulk Density	38 lbs./cu. ft. av.
Volume Resistivity	2×10^{13} ohm centimeters (av.)

We think you'll like THE GOODYEAR TELEVISION PLAYHOUSE—
every other Sunday—NBC TV Network

A *Better* Plasticizer *and* Dispersing Aid

POLYMEL DX

A medium soft, friable polystyrene resin type material, ranging from amber to brown with no coloring properties. Specific gravity of 1.01, melting point of 215° F. Its characteristic odor is not present in the vulcanizate and it is not known to be toxic.

POLYMEL DX is a highly efficient, low-cost resin that provides smooth, easy processing properties without sacrificing physicals. Its use permits very large proportions of fillers to be incorporated readily into rubber compounds without the milling problems that usually follow. The resin also removes tack from rubber stocks.

POLYMEL DX can be used with GR-S, natural rubber, Neoprene and nitrile compounds and helps to blend combinations of these rubbers. It will greatly reduce shrinkage of uncured stocks and thus is highly desirable for both molded and extruded goods. This reduction of nerve makes it very useful in calendered goods, also.

POLYMEL DX is very economical—not only is it a low cost product in itself, its use will enable compounders to reduce by *as much as 25% the use* of high-styrene resins, *without lowering the quality of the compound!*

Investigate this remarkable resin soon. Send for your sample today, or better yet, order enough for a trial run in your plant.

Prices FOB Baltimore

13¾¢ lb. in truck loads
14¼¢ lb. 5000 lbs. to truck loads
14¾¢ lb. 1 drum to 4900 lbs.

THE POLYMEL CORPORATION

MANUFACTURERS OF
compounding ingredients for reinforcing, plasticizing, extending and processing natural and synthetic elastomers.

Plaza 2-1240 — 1800 BAYARD ST., BALTIMORE 30, MD.

RUBBER FABRICATORS NEED ACCURATE CUTTING DIES

For Cutting

Rubber, Neoprene, Plastics, etc.
Sheeting, Foam, Sponge, Cellular,
Cured & Uncured

Gang Dies Our Specialty

- **Accuracy to close Tolerances**
- **Durability**
- **Genuine Understanding of the problems of rubber goods manufacturers**

MALLET HANDLE DIES

PURPOSE — For those who have no machinery and do not wish to purchase any. For Cutting — Rubber, Neoprene, Plastics, etc.

ADVANTAGE — Cut direct from bolts or not.

SERVICE—One to three days.

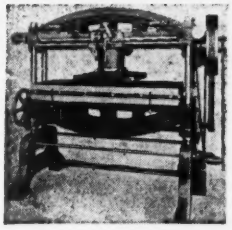
STEEL RULE CUTTING DIES

Used on Die Cutting Press, Printing Press or Power Press

PURPOSE — Especially suited for cutting — Rubber, Neoprene, Plastics, etc.

ADVANTAGE—Low in cost. Suitable for long production runs. It is necessary to cut from rectangular sheets which are fed into the press.

SERVICE—One day service.



STEEL RULE CLICKER DIES

Use On Clicker Machine or Dinker Press

PURPOSE—For Cutting Rubber, Neoprene, Plastics, etc.

ADVANTAGE — More reasonably priced than the all steel dies. Recommended for small and medium quantities where cost of an all steel die is not warranted.

SERVICE—One day service.

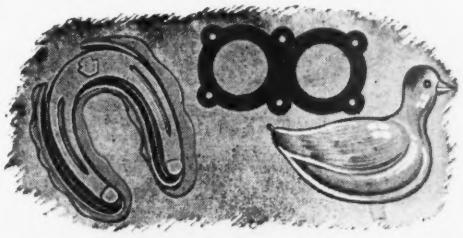
ALL STEEL DIES

Use On Clicker Machine or Beam Press or Power Press

PURPOSE—For Cutting—Rubber, Neoprene, Plastics, etc.

ADVANTAGE — Cut direct from rolls without first cutting into sheets.

SERVICE—One to three day service on dies.



DIE CUTTING SERVICE

PURPOSE—For those who prefer to have their cutting done by others.

ADVANTAGE—We can die cut your product for you on our own presses rapidly and economically at a low "per thousand" cost.

SERVICE—One to three days.

Dies for cutting
Gaskets, flashing from molded parts, rubber soles, foam and sponge for furniture padding, inflated toys, clothing and footwear, etc.

SAME DAY SERVICE

ACCURATE

STEEL RULE DIE MANUFACTURERS

24-28 West 21st Street, New York 10, N. Y. CHelsea 2-0860-1

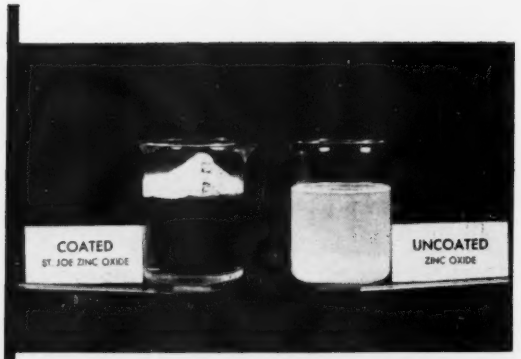
Subsidiaries: American Fabricators; Interstate Die Cutting Co., Inc.

Intelligent Service to the Rubber Goods Industry for Over 23 Years

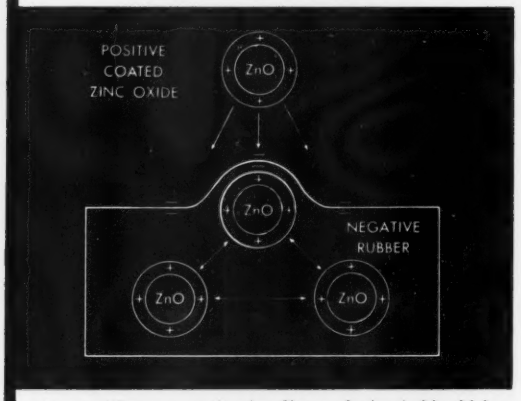
FROM **8** TO

85 CUSTOMERS

IN **5** YEARS



above: Graphic illustration of the hydrophobic nature of the surface treatment given all St. Joe coated Zinc Oxides which indefinitely resist wetting when placed in contact with water. This unique property of St. Joe coated Zinc Oxides guarantees to the consumer maximum resistance to moisture absorption during storage.



above: The monomolecular film or hydrophobic, high molecular weight organic ester on St. Joe's coated Zinc Oxide has a more positive charge than that of rubber. Thus, the rubber has a greater affinity for St. Joe's coated Zinc Oxide than for uncoated pigment with consequent reduction in incorporation time. The repelling force of the positively charged film on the zinc oxide particles themselves gives improved dispersion in less time by preventing agglomeration.

that's the success story of

ST. JOE coated ZnO

ST. JOSEPH LEAD COMPANY
ST. JOE ZINC OXIDE
JOSEPHTOWN, PA.

BLACK LABEL #20-21
Fine Particle Size

GREEN LABEL #42-21
Medium Particle Size

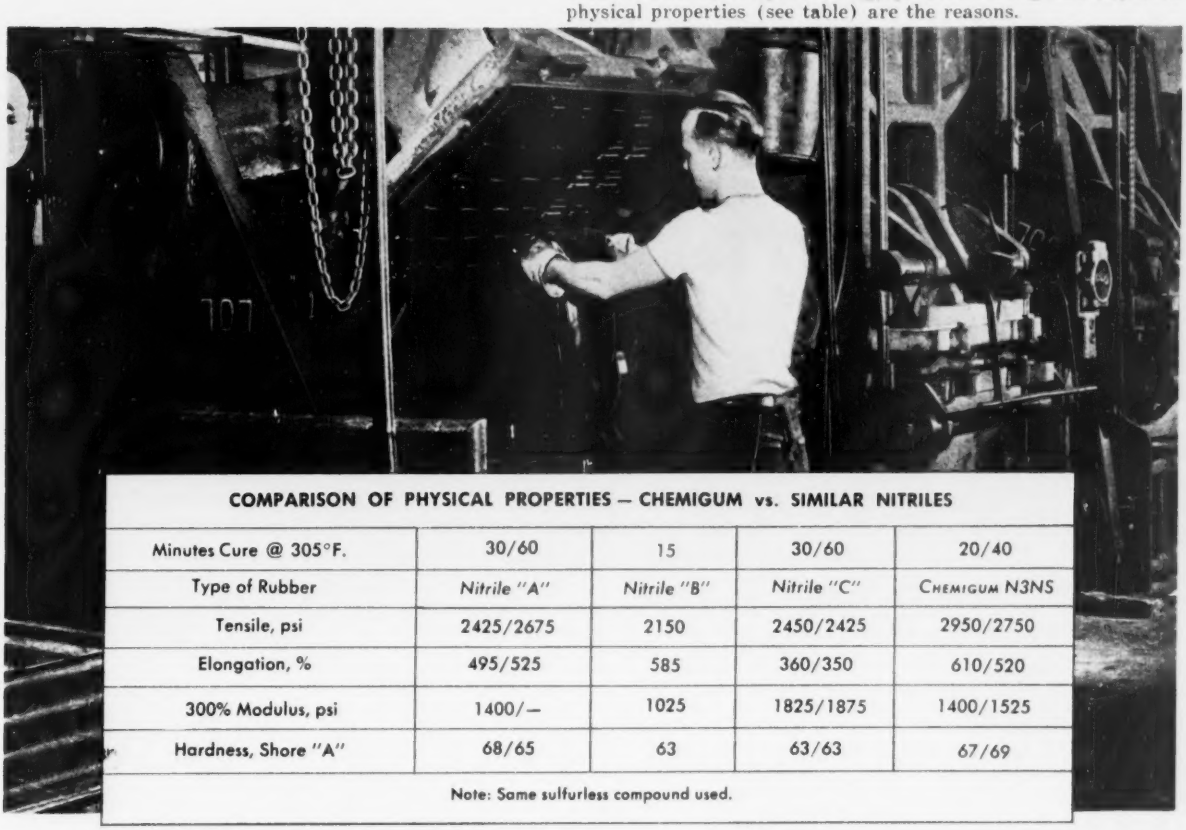
Do what 85 other rubber manufacturers have done—make a factory test and prove to yourself these advantages of St. Joe coated Zinc Oxides:

1. Moisture resistant
2. Faster incorporation
3. Better dispersion
4. Increased mixing capacity
5. Lower power consumption
6. Lower mixing temperature
7. Reduced storage space

note: All St. Joe Zinc Oxides may now be shipped as space-saving Unit-Loads. Our 6-page illustrated folder, containing detailed operating data on the St. Joe Unit-Load method is yours for the asking.

ST. JOSEPH LEAD COMPANY
250 Park Avenue, New York 17
Plant & Laboratory: Monaca (Josephtown) Pa.

OIL- AND HEAT-RESISTANT PARTS are made faster and better with CHEMIGUM. Easier processing, quicker curing and superior physical properties (see table) are the reasons.



COMPARISON OF PHYSICAL PROPERTIES — CHEMIGUM vs. SIMILAR NITRILES

Minutes Cure @ 305°F.	30/60	15	30/60	20/40
Type of Rubber	*Nitrile "A"*	*Nitrile "B"*	*Nitrile "C"*	*CHEMIGUM N3NS*
Tensile, psi	2425/2675	2150	2450/2425	2950/2750
Elongation, %	495/525	585	360/350	610/520
300% Modulus, psi	1400/—	1025	1825/1875	1400/1525
Hardness, Shore "A"	68/65	63	63/63	67/69

Note: Same sulfurless compound used.

FASTER SULFURLESS CURES

using less acceleration come with CHEMIGUM

And you get better physical properties, too.

Just look at the table above. A basic oil-resistant compound was used. Sulfur was omitted to obtain high heat-resistance. All the other rubbers required more acceleration. Nitrile "C" needed considerably more, plus some sulfur for proper cure. Yet the CHEMIGUM compound cured much faster and gave higher tensile, elongation and hardness.

Moreover its heat-resistance was equal to or better than that of the others. So was its solvent-resistance. And the CHEMIGUM processed much easier to give you still another good reason for trying this use-proved nitrile with its new, light color and smaller bale.

A postcard will bring you plenty of samples and technical help. Simply send it to:

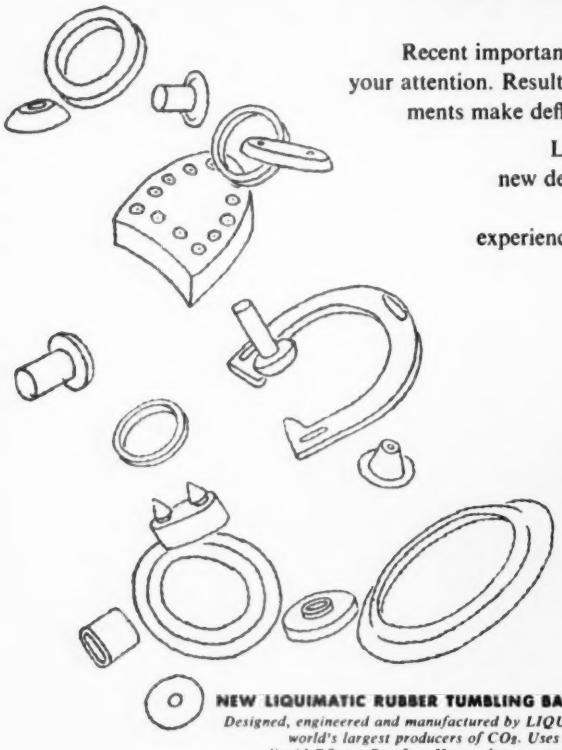
Goodyear, Chemical Division, Akron 16, Ohio

CHEMICAL GOODYEAR DIVISION

Chemigum, Pliobond, Pliolite, Plio-Tuf, Pliovic—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

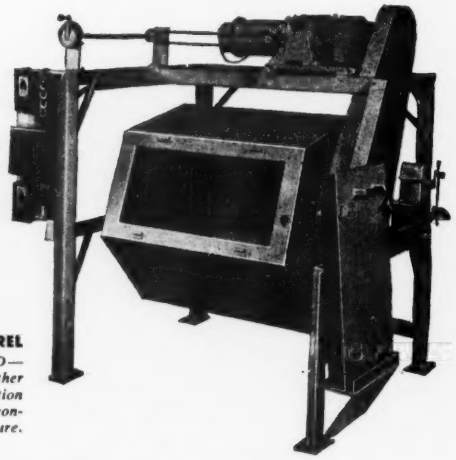
Use-Proved Products — CHEMIGUM · PLIOBOND · PLIOLITE · PLIO-TUF · PLIOVIC · WING-CHEMICALS — The Finest Chemicals for Industry

New Developments in CO_2 rubber tumbling Cut Deflashing costs



Recent important developments in CO_2 rubber tumbling deserve your attention. Results of intensive LIQUID research, these improvements make deflashing more efficient, economical and practical.

LIQUID engineers are anxious to discuss these new deflashing developments with your engineering or production personnel. These qualified, experienced experts are always available for consultation on any CO_2 or Dry Ice application. Just mail the coupon below.



NEW LIQUIMATIC RUBBER TUMBLING BARREL
Designed, engineered and manufactured by LIQUID—world's largest producers of CO_2. Uses either liquid CO_2 or Dry Ice. Heavy duty construction throughout. Stainless steel, 3" Rubatex insulated construction. Automatic control of time and temperature.

RED DIAMOND CO_2

IN WHICHEVER FORM YOU PREFER . . .

SOLID
Dry Ice
In the familiar 10" blocks.

LIQUID
Liquiflow
Tank truck to CO_2 receiver.

LIQUID also produces:
Gaswold Flame Welding and Cutting Equipment • Red Diamond Commercial Gases – Acetylene, Oxygen, Hydrogen and Nitrogen • A full line of Arc and Spot Welding Equipment and supplies

THE LIQUID CARBONIC CORPORATION
3100 SOUTH KEDZIE AVENUE • CHICAGO 23, ILLINOIS

THE LIQUID CARBONIC CORPORATION
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I would like more information on LIQUID's new developments in Rubber Tumbling.

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COMPANY_____

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Announcing

2 NEW
additions in
the FAMOUS

TY·PLY®

RUBBER-TO-METAL
ADHESIVE FAMILY

TY-PLY "UP" NEW UNIVERSAL PRIMER

TY-PLY "RC" RUBBER COVER CEMENT

Exceptionally suitable for natural rubber stocks (both normal and low-sulfur), standard and cold-polymerized GR-S's, polybutadiene, oil-modified GR-S, arctic-type GR-S and natural GR-S blends. Both adhesives have excellent shelf and working stability; are insensitive to weather or ozone conditions; and work well over a wide range of curing temperatures.

TY·PLY (Q) or (3640) for bonding Natural, GR-S, and Butyl

TY·PLY (BN) for bonding N-types

TY·PLY (S) for bonding Neoprene

TY·PLY will adhere most vulcanized rubber compounds to almost any clean metal surface

Marbon

MARBON CORP.

GARY, INDIANA

SUBSIDIARY OF BORG-WARNER

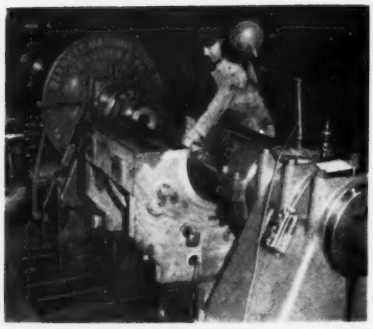
TY·PLY has stood the test of time . . . since '39

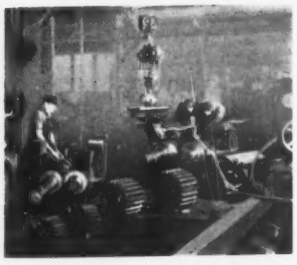
A BETTER JOB *For You* - - -

INTERSTATE

"REBUILDS" YOUR BANBURY BODY

Mostly With NEW Parts



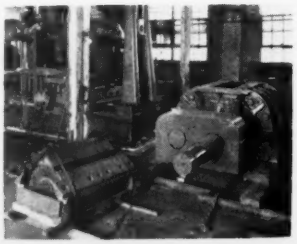


This is what you receive when INTERSTATE "rebuilds" your Banbury body:

> The jackets bored out and NEW high-carbon steel sleeves inserted, machined to precision measurements. The rotors built up to original dimensions and completed protected with NEW hard-surfacing materials. The rings are ALL NEW. There are NEW brass bushings, a NEW door top, NEW leathers and packing in piston and piston-rod gland, NEW oil tubes, NEW body fitting dowels, reversed connecting gears. The completed job is accurately assembled and painted—A Better Job—For You.

Interstate Engineers know, from 21 years' specialized Banbury experience, every detail and size and shape of each Banbury part, and Interstate commands the finest possible shop equipment. All sizes of Banburys are handled, and any part needed can be fabricated.

Estimates furnished without obligation. One of our engineers will inspect your Banbury installation at your request.



INTERCHANGE your present body for one of ours, completely rebuilt, or use our "Pre-Plan" method to have your body rebuilt and returned. Either way YOU SAVE. We have now available, subject to prior sale, rebuilt bodies in sizes 3, 9, and 11, each with door and cylinder. Write Us — And Save.

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EXCLUSIVE SPECIALISTS IN BANBURY MIXER REBUILDING

INTERSTATE WELDING SERVICE

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A guide for selecting

SHELL DUTREX®

PLASTICIZERS and EXTENDERS

For GR-S and Natural Rubber

For highly loaded stocks use

DUTREX 6
DUTREX 6 H (SPX-97)
DUTREX 20

For general purpose applications use

DUTREX 6
DUTREX 7
DUTREX 15E
DUTREX 15W
DUTREX 6 H (SPX-97)
DUTREX 20

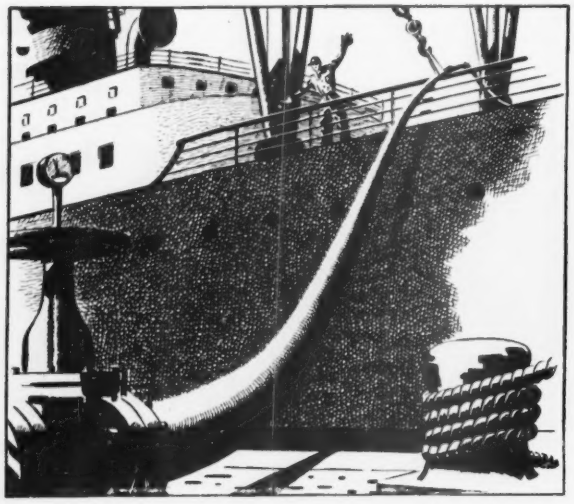
For Buna N synthetic rubber

DUTREX 21
DUTREX 25

For Neoprene WHV

DUTREX 6
DUTREX 20

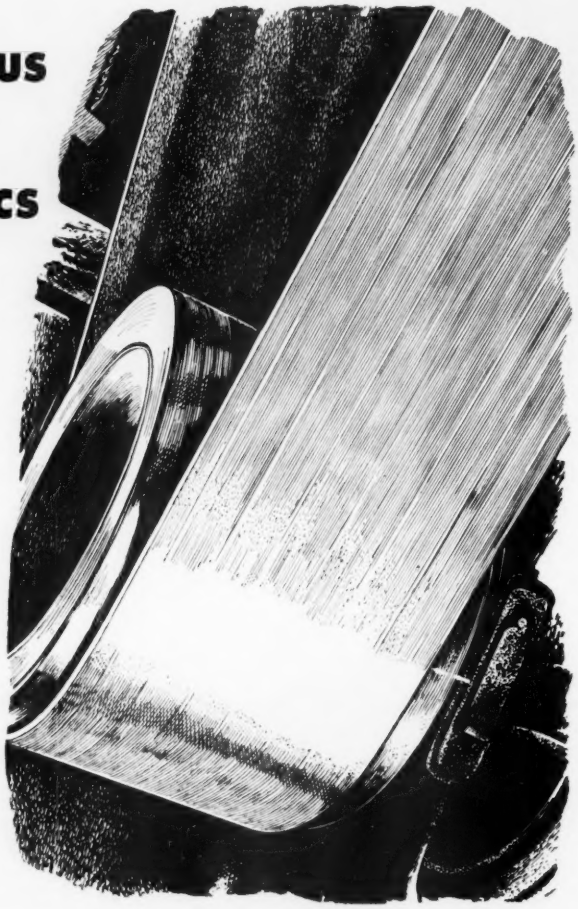
SHELL OIL COMPANY
50 WEST 50th STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA



"Shawmut" hose duck is a soft, strong, plied-yarn fabric affording flexibility and good impregnation in a variety of hose applications.

"Columbus" sheeting is ideally suited for service rainwear and other rubberized products because of its constantly uniform quality.

YOU GET PERFORMANCE-PLUS WITH WELLINGTON SEARS "FIBER-ENGINEERED" FABRICS



In developing high-performance belt fabrics for the rubber industry, Wellington Sears engineers draw upon the special advantages of many textile fibers and fiber combinations.

In addition to "Shawmut" belting duck, long-known as a standard among cotton belt fabrics, Wellington Sears has developed fabrics "fiber-engineered" to meet special requirements—such as unusual strength combined with minimum weight and bulk. These fabrics give you performance-plus—service-plus—features because they utilize to the full the unique qualities of cotton, nylon, high-tenacity rayon and other fibers... singly or in combination.

You'll find other Wellington Sears fabrics for various mechanical rubber products, coating applications and specialties, listed below.

Write for your free copy of "Modern Textiles for Industry" which includes pertinent information on rubber applications. Address: Wellington Sears Co., Department L-7, 65 Worth Street, New York 13, New York.

Superior Fabrics for the Rubber Industry

- Belting duck
- Hose duck
- Enameling duck
- Army duck
- Single and plied-yarn chafers
- Sheeting
- Airplane cloth
- Balloon cloth
- Nylon, high tenacity rayon, other synthetics and combinations.

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A SUBSIDIARY OF WEST POINT MANUFACTURING COMPANY

FIRST In Fabrics For Industry

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This **LOW COST** Cabot Oil Furnace Carbon Black

Adds **DOLLAR VALUE**

to YOUR CARCASS AND TREAD BASE COMPOUNDS

CABOT **Sterling®-V**

V for VERSATILE and VALUE

Sterling® V is excellent for SIDEWALL, CARCASS, BREAKER, CUSHION, UNDERTREAD AND BEAD STOCK COMPOUNDS, *because it gives*

GOOD PROCESSING PROPERTIES
LOW HEAT BUILD-UP
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For further technical information, write

CABOT

GODFREY L. CABOT, INC.

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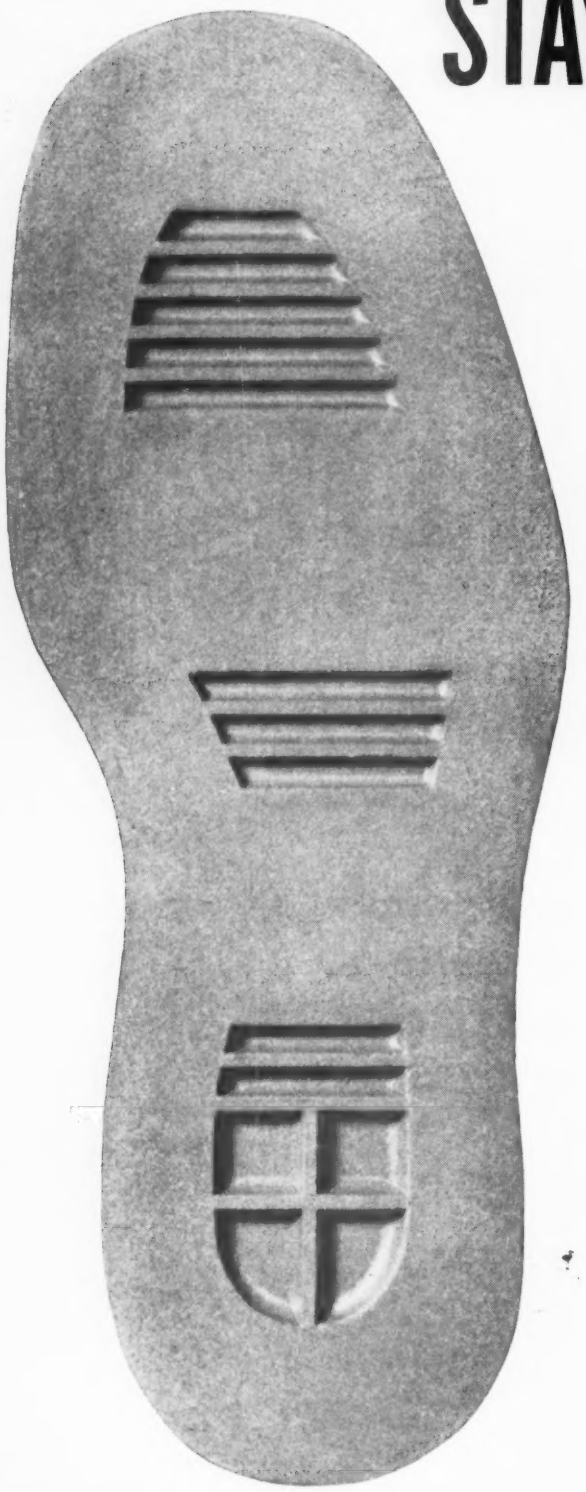
MILLIONS OF SOLES SAVED BY STAYBELITE® RESIN



Rejects are lost soles, but by providing better control over the production of conventional and expanded rubber soling, Hercules Staybelite Resin can help keep your reject ratio to a minimum.

Staybelite gives a stringy kind of tenacity to uncured and semi-cured rubber which provides improved control over processing. And its pigment dispersing ability means more starting points, more uniform cell structure, and more "blow" with a given amount of gas-producing material.

Staybelite's resistance to oxidation, its pale color, and lack of odor make it ideal as a processing aid for all types of soling and heels. In some cases, the presence of Staybelite in the formulation materially reduces objectionable odors caused by other necessary materials.

For information on the diversified uses of Staybelite Resin in rubber compounding, write for technical booklet.

Naval Stores Department
HERCULES POWDER COMPANY
INCORPORATED
918 Market Street, Wilmington 99, Del.

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When you buy Blacks

UNITED
CARBON COMPANY, INC.

Kosmos 60 is an HAF black with the proper appeal. It is made right and therefore has the quality and uniformity which compounders prefer.

Kosmos 60 mixes readily, processes well, tubes to satisfaction and cures tight. It adds real strength and imparts superb resistance to wear and flex. It ages well.

Kosmos 60 gives the performance and durability currently demanded of stocks subjected to severe service.

For a lasting enviable reputation let United blacks serve as the backbone of your rubber goods.

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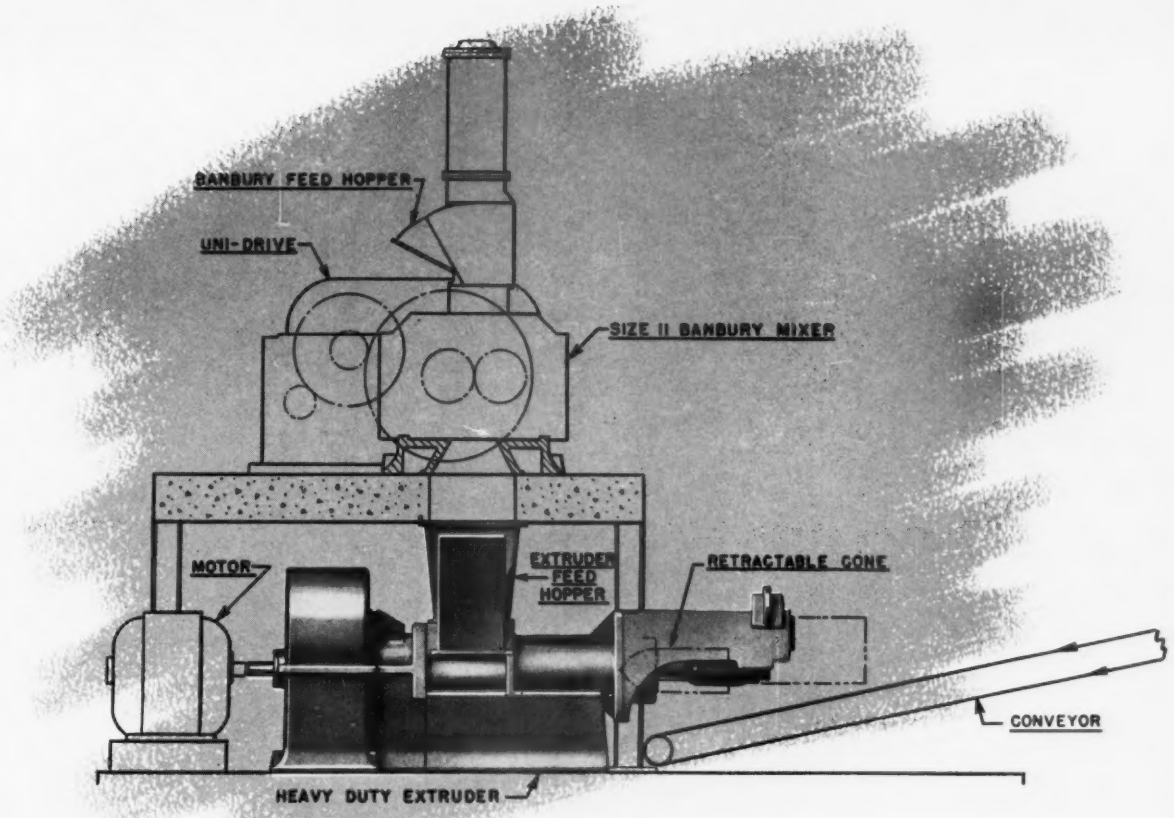


HOW TO CASH IN ON THE FULL POTENTIAL OF YOUR BANBURY* MIXER

In the setup diagrammed, a Farrel-Birmingham 15″ extruder handles the full output of a size 11 Banbury mixer on short-cycle operation of 1½ to 2½ minutes.

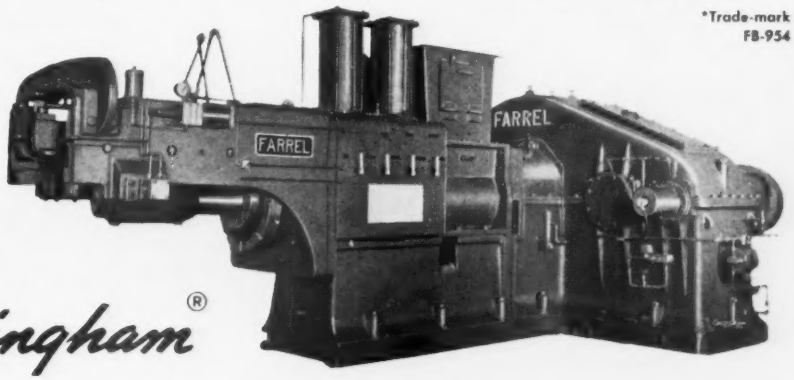
On longer-cycle operation, it can be used with two size 11 Banbury mixers. A belt conveyor carries the discharge from one mixer to the extruder hopper, alternating with the gravity feed from the other Banbury. With this arrangement, production can be maintained at 10,000 to 18,000 pounds per hour.

Using extruders to handle Banbury output, you cut out the bottleneck of milling operations following Banbury processing, at the same time eliminating all manual handling connected with milling. Operation is automatic; flow of material is accelerated and simplified; the plasticity of stock worked by the extruder screw is more uniform than that of milled stock; and stocks are generally at no higher temperature leaving the extruder than they are when discharged from the Banbury.

Further information will be sent on request, or we shall be glad to have our engineers recommend an installation suited to your production requirements.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT
Plants: Ansonia and Derby, Conn., Buffalo, N.Y.
Sales Offices: Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston

*Trade-mark
FB-954



Farrel-Birmingham®

DOW CORNING MOLD LUBRICANTS MAKE MANDRELS COME CLEAN!

Moe Muscles doesn't know his own strength since the company switched to Dow Corning silicone release agents for mandrels. Inspector Mike is happy, too, because tubing strips cleaner than ever before. High interior surface finish and precise I.D.'s are the order of the day, while scrap has dwindled to the vanishing point. Mandrels stay clean from 5 to 20 times longer, too.

That's because Dow Corning silicones can't break down to form a carbonaceous build-up on mandrel or mold surfaces. Cleaning schedules are reduced, service life is lengthened, and maintenance costs are cut by as much as 80%.

For easier release and better quality in your own pressroom, specify Dow Corning silicone mold release agents: Emulsions for molds, mandrels and curing bags; Fluid for green carcasses and for bead and parting line release.

first in silicones

DOW CORNING CORPORATION

MIDLAND MICHIGAN

DOW CORNING SILICONES

ATLANTA CHICAGO CLEVELAND DALLAS DETROIT LOS ANGELES NEW YORK WASHINGTON, D.C. (SILVER SPRING, MD.)

CANADA: DOW CORNING SILICONES LTD., TORONTO ENGLAND: MIDLAND SILICONES LTD., LONDON FRANCE: ST. GOBAIN, PARIS

1 gram of DOW CORNING ANTIFOAM A kills foam in...

- **110 POUNDS** of *butadiene-styrene emulsion*
- **190 POUNDS** of *Geon latex*
- **2332 POUNDS** of *neoprene latex*
- **100 POUNDS** of *soapy latex dip*

Effective at very low concentrations, Dow Corning Antifoam A Compound is the most economical, the most efficient and the most versatile foam-killer ever developed for the rubber industry. Hundreds of rubber producing and processing plants depend on Dow Corning Antifoam A to cut processing time, to save productive capacity now wasted on foam, and to eliminate waste and rejects; reduce operating costs.

DOW CORNING ANTIFOAM AF EMULSION

is a water dilutable defoamer containing 30% Antifoam A. It is easily dispersed, equally versatile and equally effective against aqueous foamers.

mail coupon TODAY for **free sample**

DOW CORNING SILICONES

Dow Corning Corporation
Midland, Mich., Dept. CM-21

Please send me:

☐ Technical data on Dow Corning Mold Release Agents
☐ Free Sample of Dow Corning Antifoam A
or ☐ Dow Corning Antifoam AF Emulsion

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Gold-plating samples for "3-D" examinations!

Chances are, you'll never order gold-plated pigment, but its use in the Glidden laboratory is important to you. Resinous replicas of test pigment particles are gold-plated to accent the high and low areas. When these replicas are micrographed through an electronic microscope, the 3-dimensional effect indicates the physical structure of the original particle. This electronic-micrograph is then compared with one of a standard particle to check uniformity.

Similar tests for impurities, color, hiding power and other properties are part of the Glidden quality control program which insures your satisfaction with Glidden ZOPAQUE Titanium Dioxides; CADMOLITH Reds and Yellows; SUNOLITH Lithopones. Write for detailed specifications.

THE GLIDDEN COMPANY

Chemicals • Pigments • Metals Division

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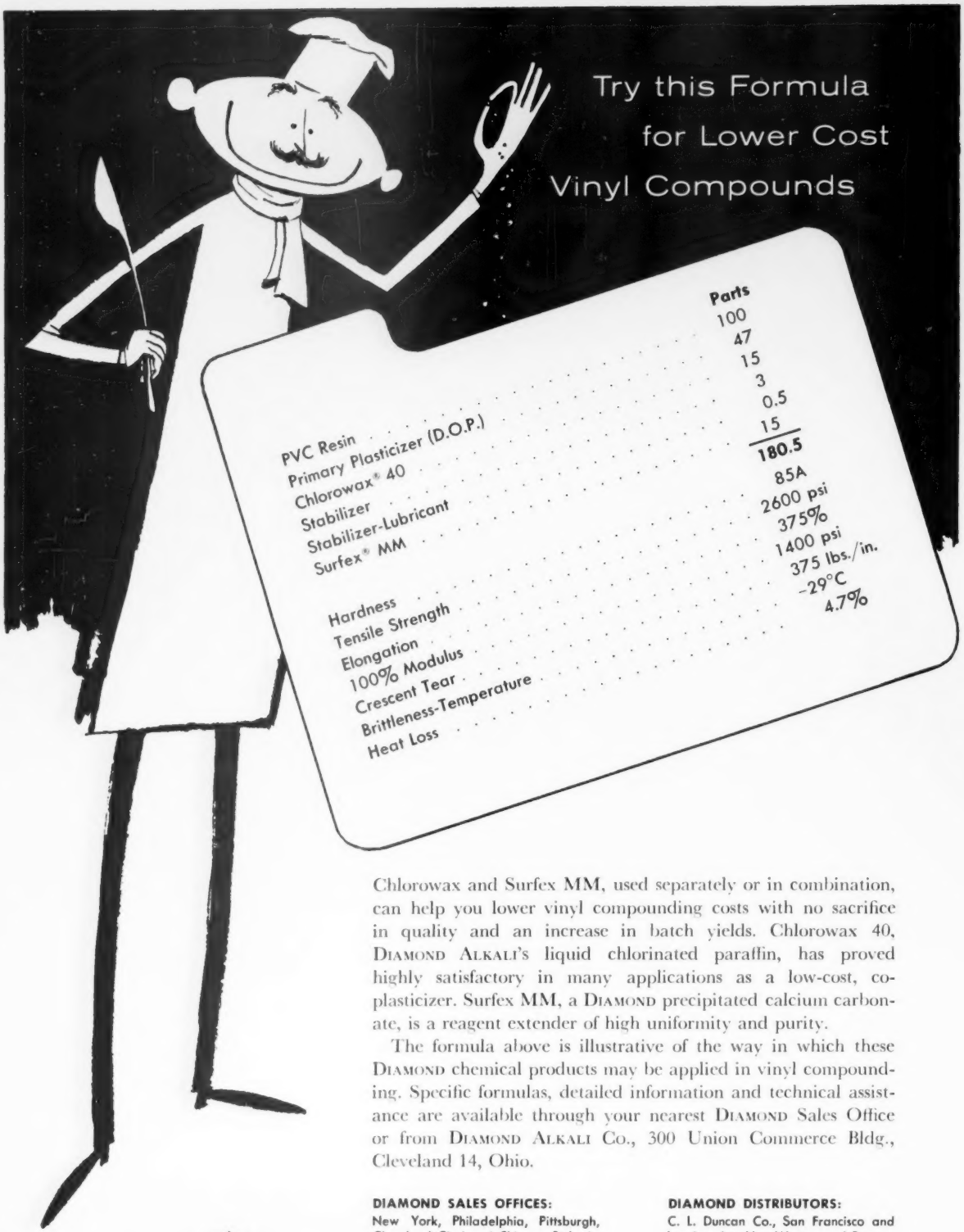
CHEMICALS
PIGMENTS
METALS

QUALITY
Glidden
PRODUCTS



Chlorowax and Surfex MM, used separately or in combination, can help you lower vinyl compounding costs with no sacrifice in quality and an increase in batch yields. Chlorowax 40, DIAMOND ALKALI's liquid chlorinated paraffin, has proved highly satisfactory in many applications as a low-cost, co-plasticizer. Surfex MM, a DIAMOND precipitated calcium carbonate, is a reagent extender of high uniformity and purity.

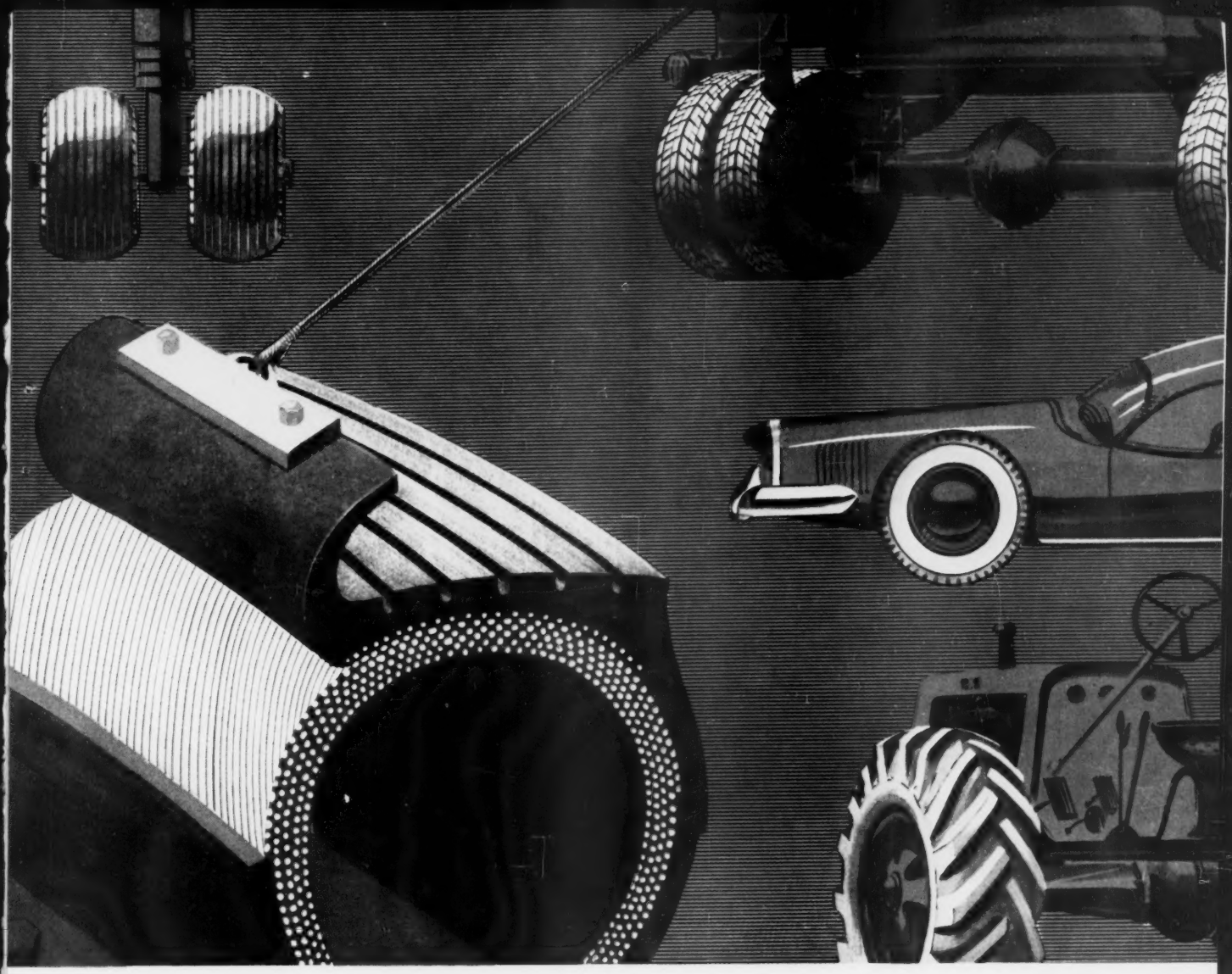
The formula above is illustrative of the way in which these DIAMOND chemical products may be applied in vinyl compounding. Specific formulas, detailed information and technical assistance are available through your nearest DIAMOND Sales Office or from DIAMOND ALKALI Co., 300 Union Commerce Bldg., Cleveland 14, Ohio.

DIAMOND SALES OFFICES:
New York, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, St. Louis, Memphis, Houston.

DIAMOND DISTRIBUTORS:
C. L. Duncan Co., San Francisco and Los Angeles; Van Waters and Rogers, Inc., Seattle and Portland, U.S.A.; Harrisons & Crosfield (Canada) Ltd.

DIAMOND ALKALI CHEMICALS ®

DIAMOND ALKALI COMPANY
CLEVELAND 14, OHIO



Pyratex makes cord and carcass ONE...for life

New Pyratex—a specially developed vinyl pyridine latex for tire cord treatment—greatly increases cord-to-carcass adhesion and reduces bond fatigue and ply separation.

Try Pyratex in your own stocks—for tires, drive belts, conveyor belts—wherever you need a permanent rubber-to-fabric bond.

To learn more about Pyratex—developed by the same company that brought you the first natural latex for tire cord treatment, the first reclaim dispersion, and GR-S plus Resorcinal—simply write on your letterhead to the address below.

50th ANNIVERSARY 1904 1954 NAUGATUCK CHEMICAL

Naugatuck Chemical

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NAUGATUCK, CONN.

Division of United States Rubber Company

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everything vinyl does...

it does beautifully with

TITANOX®

This is beauty with a practical side. Hundreds of durable vinyl products, including upholstery materials, drapes, and shower curtains look their best when properly pigmented. And the best beauty treatment for vinyl is TITANOX white titanium dioxide pigments.

In vinyl, TITANOX rutile and anatase titanium dioxides impart exceptional whiteness, brightness and opacity, and their compatibility with all types of natural and synthetic polymers helps maintain natural strength. These modern pigments maintain bright, clean tints and their fine, uniform particle size means easy grinding and mixing for complete dispersion throughout the polymer.

Consult with our Technical Service Department for assistance with your problems in pigmenting natural or synthetic polymers. Titanium Pigment Corporation, 111 Broadway, New York 6, N.Y.; Atlanta 2; Boston 6; Chicago 3; Cleveland 15; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Limited, Montreal 2; Toronto 1.

®TITANOX

the brightest name in pigments

TITANIUM PIGMENT CORPORATION

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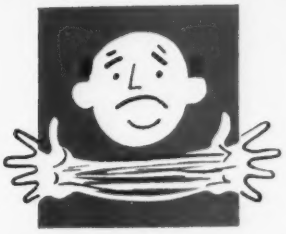
DRY *but profitable facts about* SILENE® EF



Columbia-Southern® Silene EF—a finely divided precipitated calcium silicate—is widely known as an excellent and economical rubber reinforcing pigment. It is used extensively for such goods as soling, wringer rolls, drug sundries, mechanical and molded goods. But don't limit your thinking of Silene EF to reinforcing alone, because Silene EF has other extraordinary characteristics that may prove of real value to you in compounding.

The very fine particle size of Silene EF gives it unusual surface area and sorptive powers. Consequently, a few parts of Silene EF can be effective in drying up sticky or gummy reclaim stocks, for example, to a workable consistency.

Or, Silene EF can be used for changing liquid or pasty accelerators, or other compounding ingredients, into dry powders.

Or, Silene EF can be added to certain dry ingredients to increase flowability and prevent caking of the material in storage or handling.

If you think Silene EF can be useful in your operations . . . we shall be happy to supply you with experimental quantities and offer our technical assistance.

IS YOUR COLUMBIA-SOUTHERN SILENE EF DATA UP-TO-DATE?

Much of our previously published Silene EF data has been revised and condensed. If you are interested in obtaining our bulletin, write today, asking for Silene EF Bulletin No. 2.

COLUMBIA-SOUTHERN CHEMICAL CORPORATION
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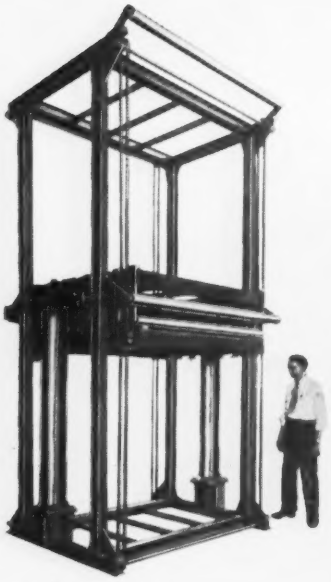
ADAMSON UNITED

Rubber..... AND Plastics

CALENDER ACCESSORY EQUIPMENT



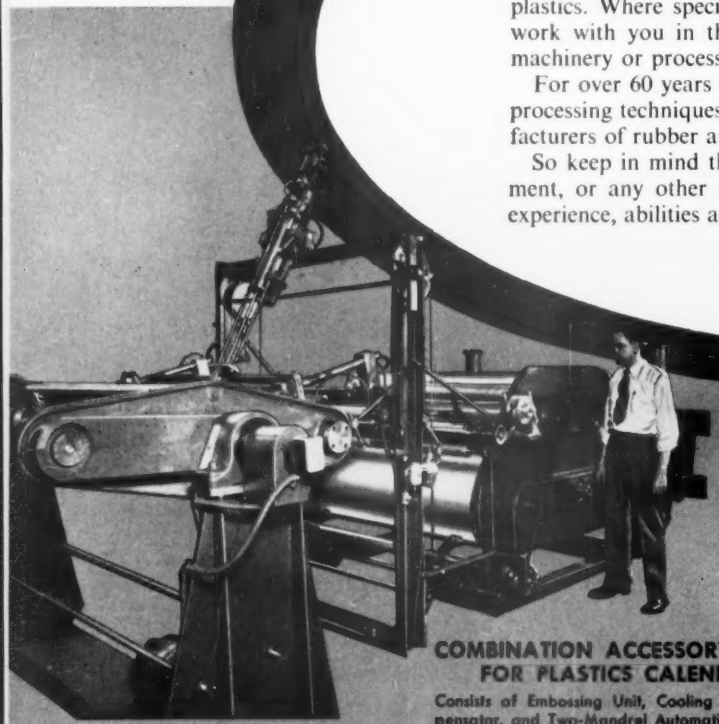
FESTOONER

A double-acting unit for handling various types of tire cord. It is used in conjunction with high-speed precision calendering equipment to store fabric while the let-offs or windups are stopped for roll changes.

Adamson not only engineers and builds a complete line of standard and special calenders, but in addition can supply all types of Calendering Accessory Equipment required for the continuous processing of rubber or plastics. Where special equipment is needed, our engineers are available to work with you in the development, design and construction of the right machinery or process to meet your requirement.

For over 60 years Adamson has pioneered in the advancement of rubber processing techniques, and today is a major supplier of equipment to manufacturers of rubber and plastics products the world over.

So keep in mind that whether it's Calenders, Calender Accessory Equipment, or any other type of rubber or plastics processing machinery, our experience, abilities and manufacturing facilities are at your service.

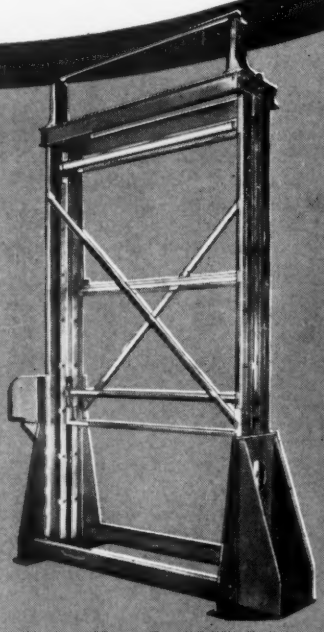


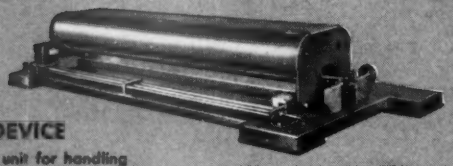
COMBINATION ACCESSORY TRAIN FOR PLASTICS CALENDER

Consists of Embossing Unit, Cooling Drum Stand, Compensator, and Two-Mandrel Automatic Turret Windup.

SINGLE ROLL COMPENSATOR STAND

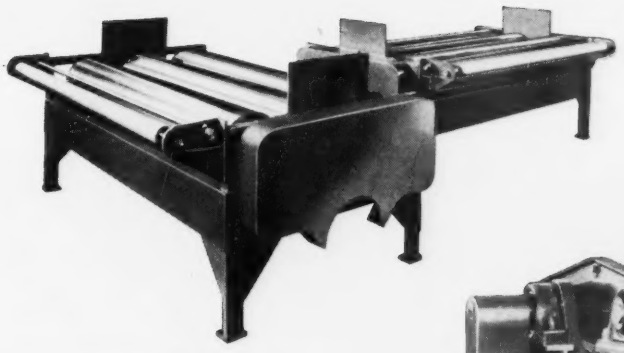
For coordinating the speed of various elements in a calender train.





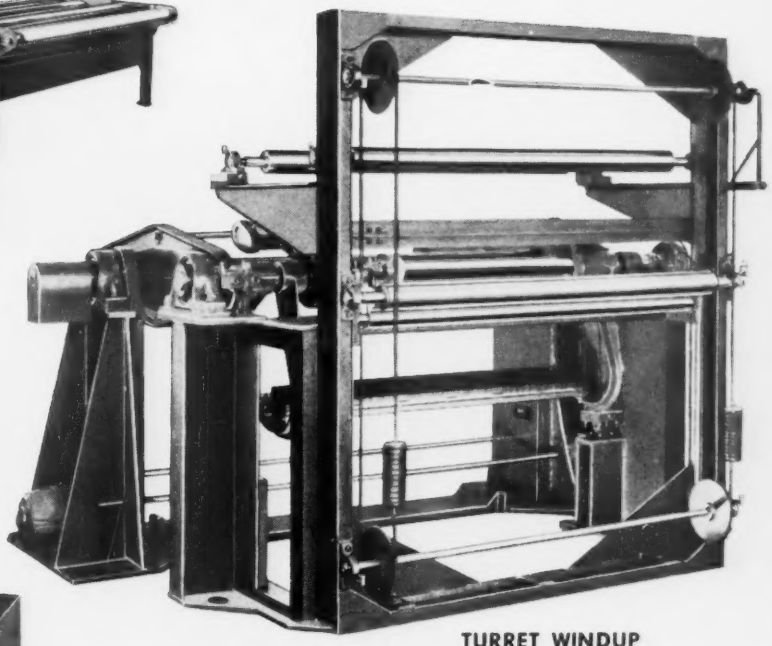
FABRIC CENTERING DEVICE

A rugged, 3-roll motor-driven unit for handling tire cord prior to its entry into the calender.



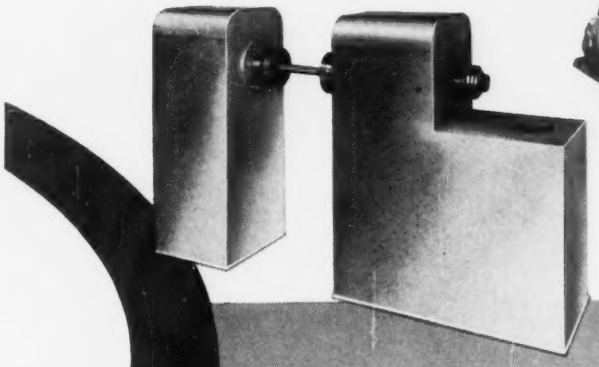
SURFACE WINDUP UNITS

Simple, conventional, drum-type windups for handling plastic film, plastic sheeting and coated fabrics.



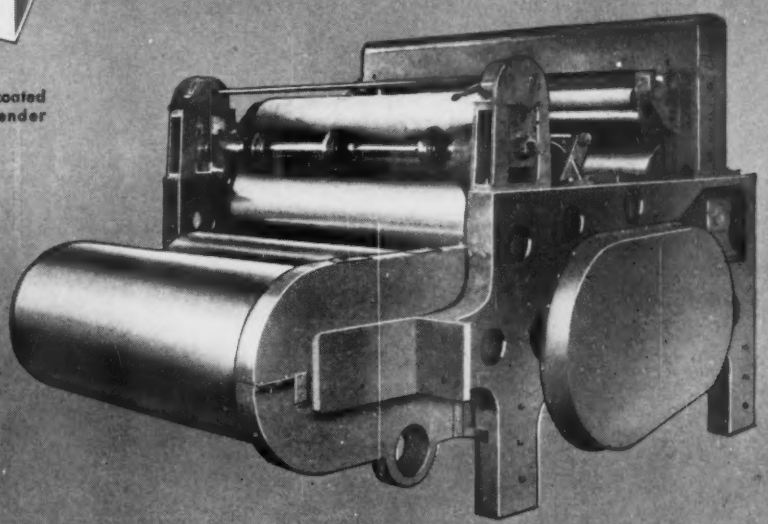
TURRET WINDUP

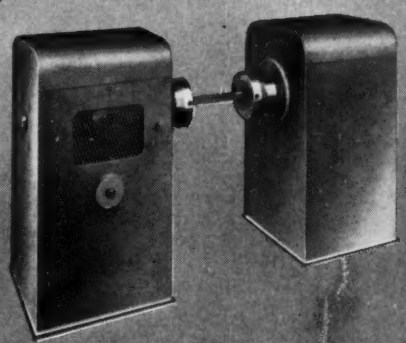
A special, center-drive windup designed specifically to wind very thin plastic film under accurately controlled, minimum tension. Equipment includes Two-Mandrel Turret, Automatic Counter and Cutting Device.



SIMPLE WINDUP STAND

Motor driven type for winding of coated fabric. Floor mounted type. Calender mounted units are also available.





FABRIC and LINER LET-OFF

Friction type, used in handling fabric for 3-roll universal calenders or for 4-roll double-coating calenders.

SPECIAL COMBINATION COOLING AND CUTTING DEVICE for RIGID PLASTIC SHEETING. Used with 4-roll calenders, with gear ratio changing equipment, to modify length of cut. Trim chopping device included.

Write, wire or 'phone us today; without obligation, of course.

ADAMSON UNITED COMPANY

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Subsidiary of United Engineering and Foundry Company

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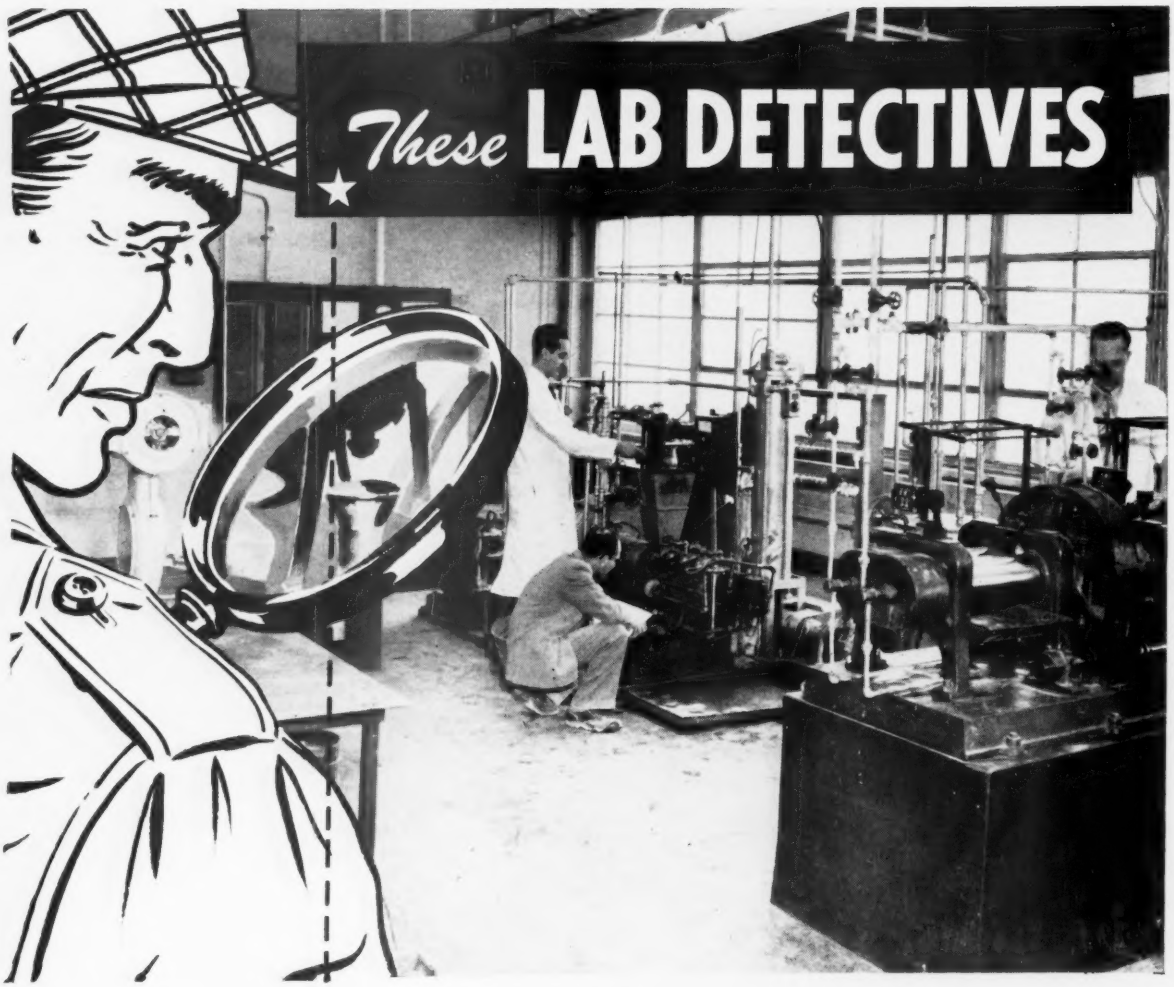

keep BUFFALO RECLAIMS UNIFORM

to guarantee CONSTANT quality of your products

The "who-done-its" have nothing on us! We have private eyes all over the place checking into every phase of our operation, delving into every batch of reclaimed rubber we process. They ask "why" and then ask "when" and then ask "what for"! Naturally, it costs money to maintain this staff of investigators and we could get along without them. BUT . . . we realize that it's good business to keep them working for us!

Working for us? Actually, they're working for you! Yes, you and all our other customers that have been buying long established, well-known Buffalo Reclaims for many years. These customers have learned to rely on the uniformity of these reclaims and their *constant* performance in their products.

We set up this force of quality-control "detectives" to make certain that we never fail to deliver EXACTLY the same properties in any given reclaim EVERY TIME. We think it a good idea . . . don't you?

Always keep reclaims in your formula . . . always look to Buffalo for the best!

U.S. RUBBER RECLAIMING COMPANY, INC.

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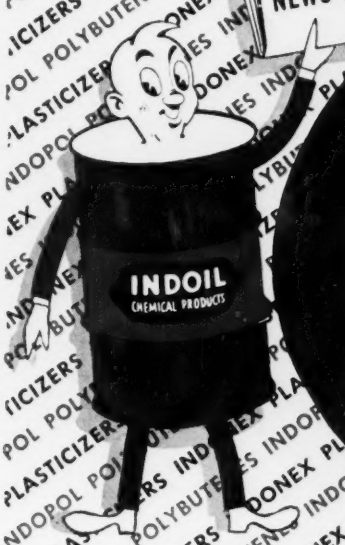
CHEMICAL PRODUCTS



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and Semi-Solid
INDUSTRIAL TIRES
INDONEX Plasticizers

REG. U.S. PAT. OFF.

permit economy by increased loadings
—give excellent wear and ageing properties
—have good molding and extrusion
characteristics.

Send for
technical literature.

INDOIL CHEMICAL CO.
910 SOUTH MICHIGAN AVENUE
CHICAGO 80, ILLINOIS

all in partnership with rubber...

but no two wires alike!

● Pictured above are four typical examples of the many special-purpose wires developed by National-Standard for wire-in-rubber products.

They do have one essential quality in common —a highly developed affinity for adhesion with rubber. But beyond that, each has a different job to do . . . and is painstakingly engineered to do it . . . effectively!

For years National-Standard has specialized in improving the behavior of wire in rubber—digging into all the intricacies of application, fabrication, finish, corrosion, strength, elongation, adhesion and innumerable details you might never bother with.

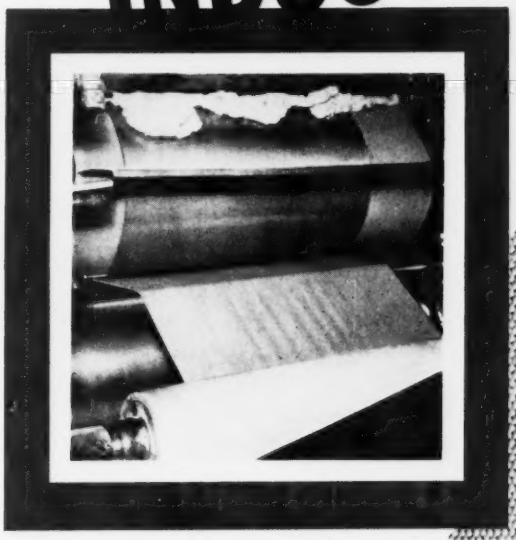
Main reason for all this research, this "groundwork", is to help you improve your products, increase production, conserve materials and cut costs! Perhaps you now face *new* defense production problems involving wire. Remember, National-Standard service is always at *your* service.

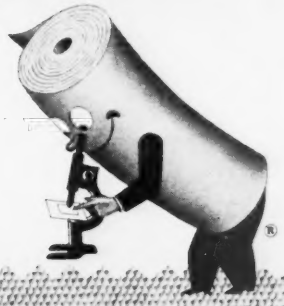
NS
NATIONAL-STANDARD Company
NILES, MICHIGAN

DIVISIONS OF NATIONAL-STANDARD CO.

ATHENIA STEEL	*Clifton, N. J.* — Flat, High Carbon, Cold Rolled Spring Steel
NATIONAL-STANDARD	*Niles, Mich.* — Tire Wire, Fabricated Braids and Tape
REYNOLDS WIRE	*Dixon, Illinois* — Industrial Wire Cloth
WAGNER LITHO MACHINERY	*Jersey City, N. J.* — Lithographing and Special Machinery
WORCESTER WIRE WORKS	*Worcester, Mass.* — Round and Shaped Steel Wire, Small Sizes

UNIFORMITY
Makes The Big Difference In
INDUSTRIAL FABRICS





MT. VERNON FABRICS Give You Greater Uniformity

Checking evenness of sliver with linear regularity tester. One of a series of laboratory controls throughout production to assure fabric uniformity in all Mt. Vernon-Woodberry products.

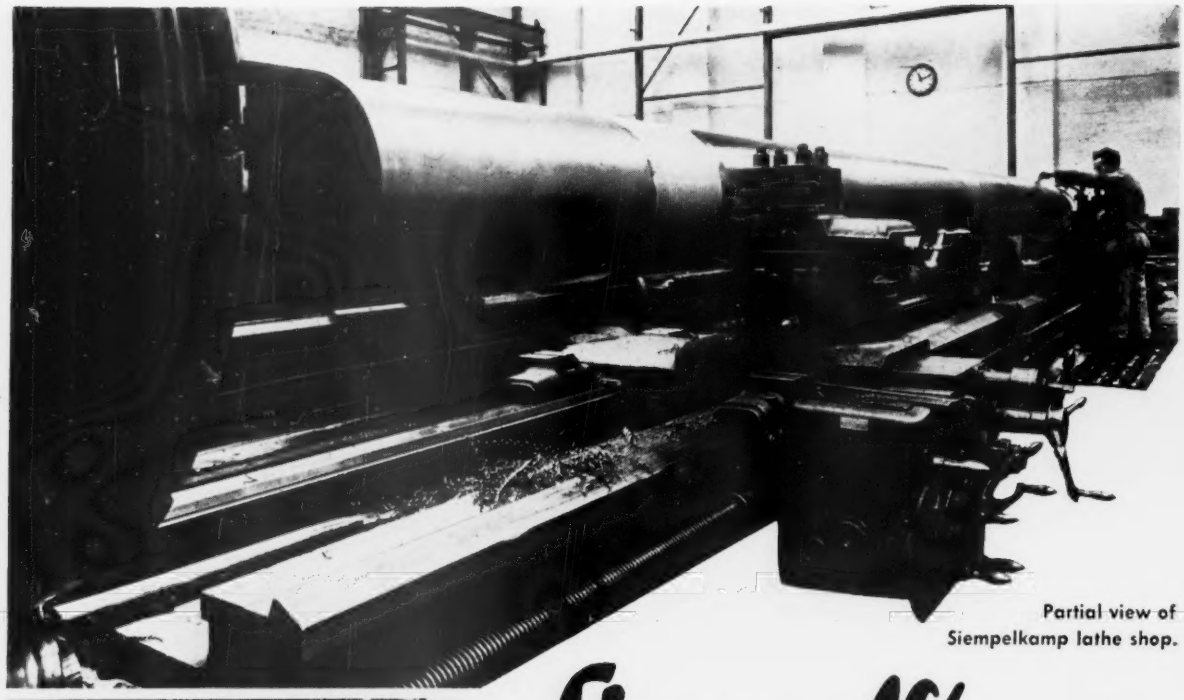
Mt. Vernon-Woodberry Mills

TURNER HALSEY COMPANY
Selling Agents

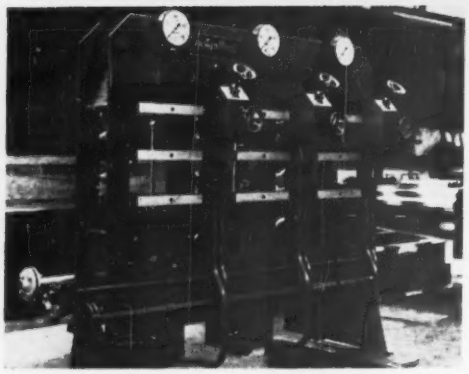
Main Office: 40 Worth St., New York
Branch Offices: Chicago • Atlanta
Baltimore • Boston • Los Angeles

FABRICS ENGINEERED TO FIT YOUR NEEDS

Need adaptation of an existing fabric to your special purposes? Or creation of an entirely NEW fabric—cotton, synthetic or blend – to meet your specifications? Mt. Vernon-Woodberry's staff of textile engineers is available on request to help you with your problems in development or application of industrial fabrics.



Partial view of Siempelkamp lathe shop.



Series press, single frame construction.

Gooseneck type vulcanizing press.

Siempelkamp

HYDRAULIC PRESSES

On large or small rubber vulcanizing presses SIEMPELKAMP offers you substantial savings.

Since 1883, SIEMPELKAMP, with all the Old World know how, has been producing the most modern presses and equipment for rubber manufacturers all over the world.

Let us quote on your next job. The savings effected will mean greater profits for you.

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AZO-ZZZ-44 and AZO-ZZZ-55 assure good dispersion and easy processing because of their uniform particle size and absence of extreme fines. With AZO-ZZZ-11, 22, 33, (Acicular types) and special grades, a complete range of zinc oxides is offered for every rubber requirement.

A RELIABLE SOURCE

American Zinc assures an uninterrupted supply of zinc oxide. Recent discovery and development of a new, large ore body, added to previous American Zinc reserves, provides sufficient ore to last many years at the current rate of production.

AZO **ZZZ-44**
ZZZ-55

AMERICAN ZINC SALES COMPANY

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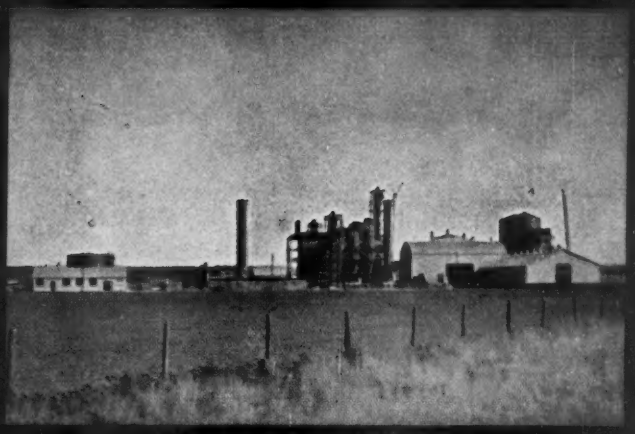
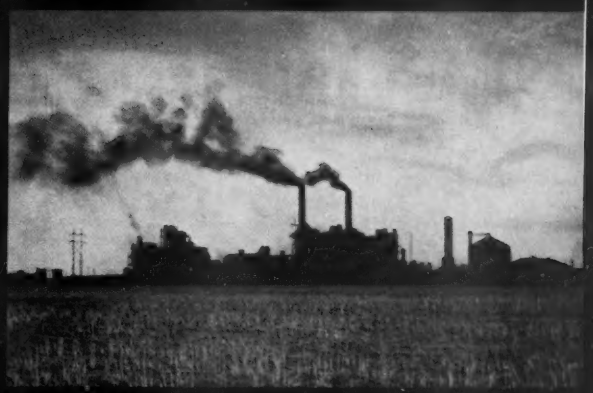


Ponca City, Oklahoma—our newest plant

Five good reasons why you can depend on

WITCO-CONTINENTAL CARBON BLACKS

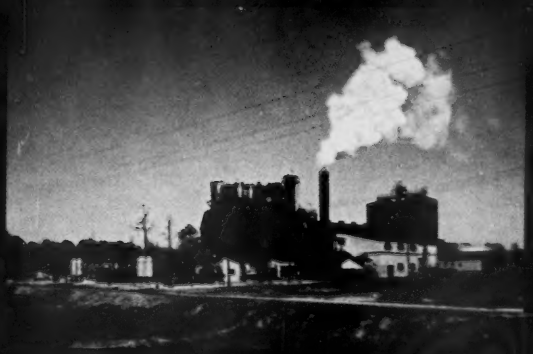
always uniform . . . always dependable



Sunray, Texas

Producing a complete line of carbon blacks under strictest quality controls to fulfill your most rigorous requirements.

Check your needs against Witco-Continental's Channel and Furnace Blacks listed on the next page . . .



Westlake, Louisiana

Eunice, New Mexico

Witco, Texas

Witco-Continental CARBON BLACKS

Recognized *for over twenty-five years* as dependable Carbon Blacks for rubber products of superior quality.

Channel Blacks

Continental® AA—Easy Processing (EPC)—Witco No. 12
Continental A—Medium Processing (MPC)—Witco No. 1
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Continental R-40—Conducting (CC)

Furnace Blacks

Continex® SRF—Natural Gas Type, Semi-Reinforcing
Continex SRF-NS—Natural Gas Type, Non-Staining
Continex HMF—Natural Gas Type, High Modulus
Continex HAF—Oil Type, High Abrasion
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Witco-Continental's technical service staff will be glad to assist you with your rubber formulation problems.

WITCO CHEMICAL COMPANY

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the only rubber plant that can't use

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For all the others Neville has a complete line of Coumarone-Indene Resins, as well as Petroleum Resins, Reclaiming Oils, Softeners, and Plasticizers.

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R-53

NEVILLE

NEVILLE CHEMICAL CO.

PITTSBURGH 25, PA.

Plants at Neville Island, Pa. and Anaheim, Cal.

MR. CLIMCO SAYS . . . .

CLIMCO LINERS

save time at the bias cutter and cutting table

Perfect separation of stock and liner is all important during these operations—for stock adhesions at either point cause expensive down time. You can avoid such production headaches by using Climco Processed Liners that can be readily peeled from the stock without sticking.

Climco Processing of your liners assures many other profitable advantages: Liner life is greatly increased, tackiness of the stock is preserved, and gauges are more easily maintained. Latitude in compounding is enlarged, lint and ravelings are eliminated and horizontal storage is facilitated.

Since 1922 Climco Processed Liners have proved their worth to the rubber industry. Give them a trial in your plant.

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Tells all about Climco Liners and Linerette and how to get better service from liners. Write for your copy now.

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Treatment Contains
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PROCESSED LINERS

Serving the Rubber Industry for 32 Years

CLIMCO
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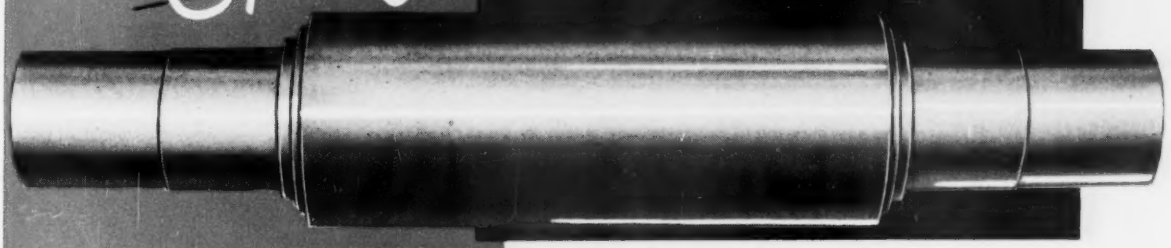
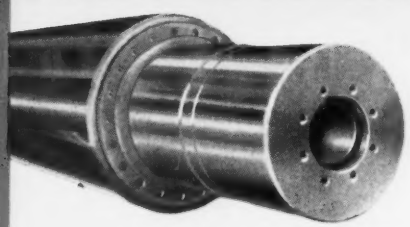
Where
UNIFORMITY
PRECISION
DEPENDABILITY
are factors . . .
Specify

UNITED®
DRILLED-TYPE ROLLS





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RUBBER
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or any materials requiring close heat control

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Our more than 50 years' experience in the design and manufacture of rolls can be helpful in solving your processing problems. Your inquiry is solicited.

UNITED Precision Ground, DRILLED-TYPE ROLLS, the result of careful metallurgical control over raw materials, and of strict quality control in every phase of manufacture . . .

MAINTAIN A UNIFORM ROLL SURFACE TEMPERATURE throughout, with minimum deviation at any point.

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PROVIDE ACCURATE, QUICKLY RESPONSIVE TEMPERATURE CONTROL.

UTILIZE FULL ROLL FACE with new, ring closure type designs.

PERMIT ADJUSTMENT OF RING CLOSURE GASKET AND BOLTS, WITH ROLL IN PLACE in calender or mill, thus eliminating production downtime due to roll removal.

MAINTAIN CORRECT DEPTH OF CHILL for iron or alloy iron rolls.

ARE ENGINEERED AND DESIGNED FOR MAXIMUM HEAT TRANSFER RATE with accurately drilled, fluid passages.

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Our precision extruders equipped with Blow-Heads produce seamless tubing or sheeting of polyethylene, polyvinyl-chloride, styrene, etc. in gauges from 25 to 100 microns at an investment cost considerably less than that for a calender installation.

If you are in need of a machine or an item of special equipment, if you intend expanding your facilities or plan entering new fields of manufacture, consult us first. We supply all types of machinery and equipment for every requirement of large and small factories.

Integrated Service provides complete design, layout and construction supervision for rubber, plastics and chemical plants, process engineering, technical service and raw material sources.

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OUTSTANDING DELAYED ACTION!

NOBS* No. 1

ACCELERATOR

No special handling is needed in using NOBS No. 1 Accelerator . . . and it gives excellent results in reinforcing furnace blacks in tire compounding and molded products.

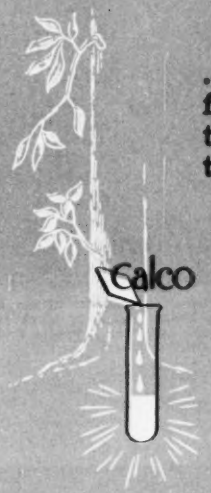
And now... the new

NOBS* SPECIAL

ACCELERATOR

. . . developed for use where special protection from scorching is essential. For full information and samples, contact our sales representatives listed below.

*Trade-mark



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AMERICAN Cyanamid COMPANY

INTERMEDIATE & RUBBER CHEMICALS DEPARTMENT

BOUND BROOK, NEW JERSEY

SALES REPRESENTATIVES AND WAREHOUSE STOCKS

Akron Chemical Company, Akron, Ohio • Ernest Jacoby and Company, Boston, Mass. • Herron & Meyer of Chicago, Chicago, Ill.
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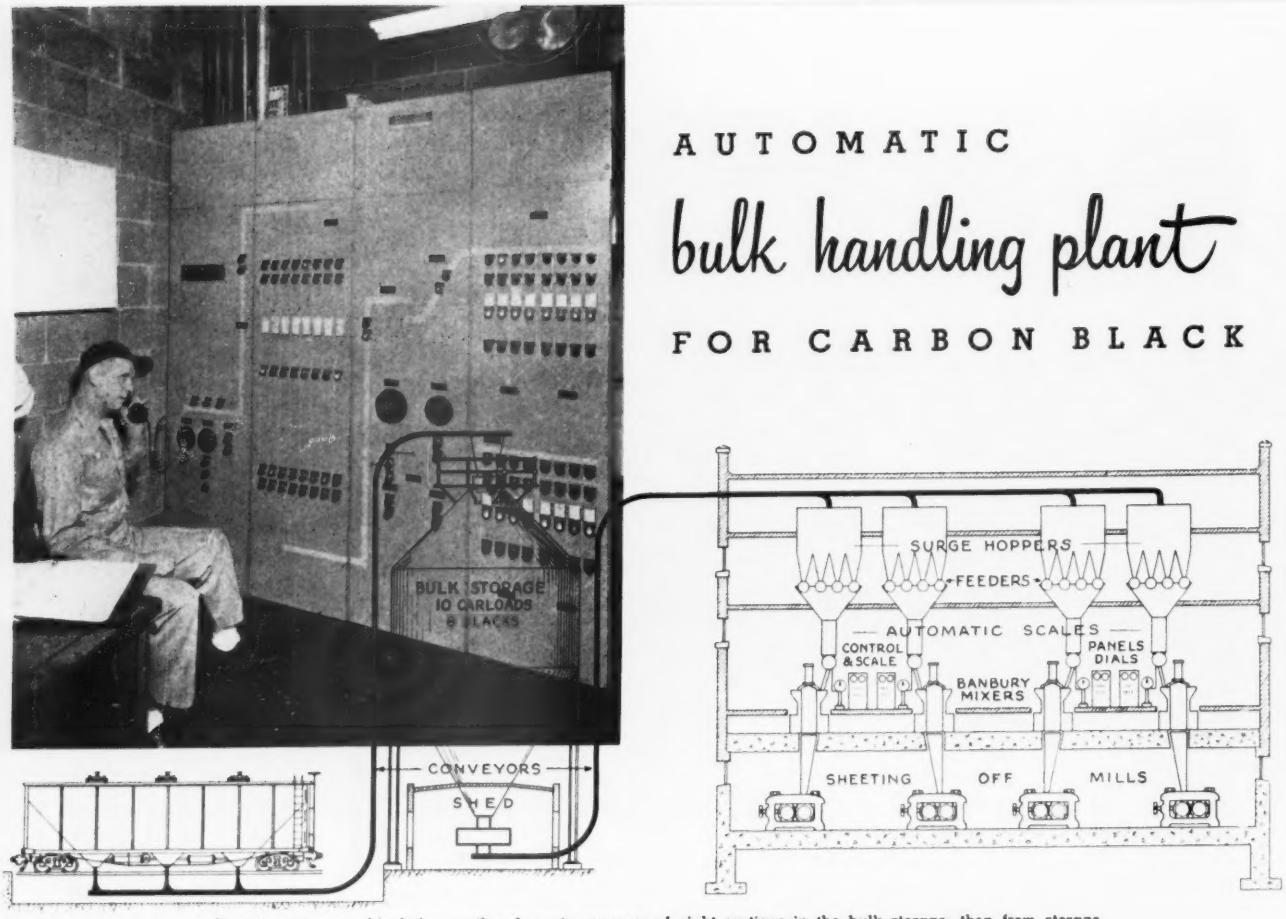
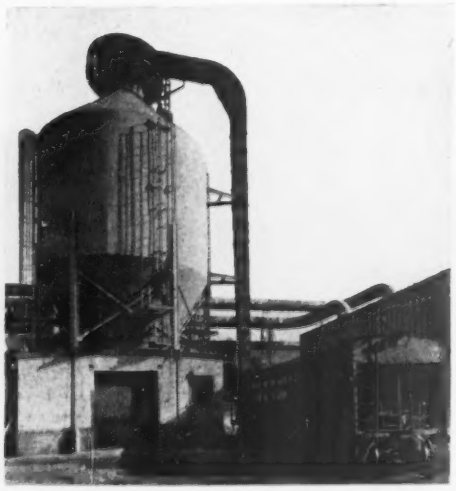
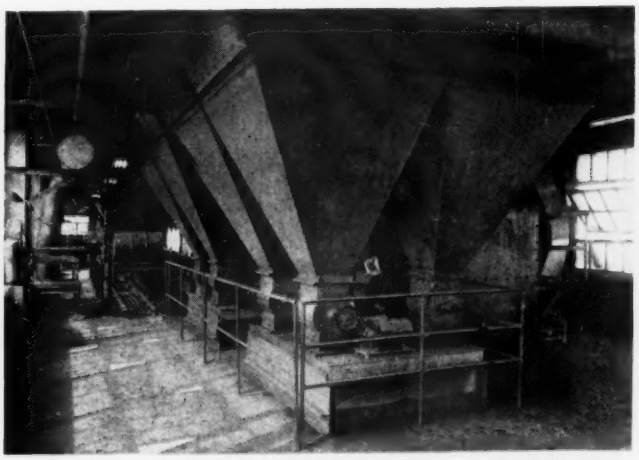
AUTOMATIC
bulk handling plant
FOR CARBON BLACK



Operator can route black from railroad car to any one of eight sections in the bulk storage, then from storage to any one of 16 surge hoppers over four Banbury Mixers. Such equipment can be adapted to any type of resins or ingredients where bulk shipments are desirable.



This illustrates conveyor lift between a railroad car and 8 compartment bulk storage.



Surge hoppers over Banbury Mixers. An operator at the Banbury Mixer sets his weigh scale for the exact amount of black required. He also sets the control and puts into operation a feeder that serves to select the type of black needed.

Carbon black moves from railroad cars to mixers without a human hand touching the material. Automatic controls elevate, convey and weigh the black into mixers. Their versatile system stores several kinds and types of black in carload lots . . . thus you have a variety of blacks available at each mixer. Push buttons on master control board route each black to its proper distribution.

For a complete plant; a specialized process; an engineering service or individual machines for rubber or plastic, write Hale and Kullgren, P. O. Box 1231, Akron, Ohio.

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THE AETNA-STANDARD ENGINEERING CO., PITTSBURGH, PA.

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Bloom PROBLEMS?

Stauffer CHEMICALS SINCE 1885

CRYSTEX 85% Insoluble Sulphur

CAN SOLVE THEM AND:

1. improve product quality and appearance

Crystex, because of its high insolubility in rubber, cannot migrate and "bloom" like ordinary sulphur in your rubber compounds. This assures better surface appearance, particularly important in white side-walls and other light colored consumer goods in which "yellow spots" would be objectionable.

By preventing bloom, Crystex improves the tack of built-up stocks such as tire carcasses, belting, and valve patch frictions, thereby guaranteeing good adhesion after vulcanization.

2. save on plant operation costs

A stock blended with Crystex can be kept for long periods before vulcanization without the danger of blooming. Mixing and vulcanization schedules can be made more flexible to permit maximum utilization of machinery and labor without the worry of a "time element" imposed by the danger of bloom.

3. increase compounding flexibility

Formulating with Crystex will allow variations to be made in factory recipes that tend to be "scorchy"; its use will control the degree of tackiness of factory stocks. The unusual characteristic of being insoluble in "anything and everything" except more sulphur may suggest additional uses in your formulations.

Enthusiastic acceptance of Stauffer CRYSTEX by the rubber industry has necessitated the construction of a new plant, and CRYSTEX is now produced at both Chauncey, N. Y., and Monongahela, Pa. Packed in 50-pound multiwall paper bags, Stauffer CRYSTEX is available in all quantities up to car-load.

Write for experimental samples or further information on the properties and uses of CRYSTEX.

STAUFFER CHEMICAL COMPANY

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For FASTER, SMOOTHER PROCESSING

Now Choose From

4 PROTOX* ZINC OXIDES

	Curing Rate	Surface Area (Sq. meters/gm.)	Base Oxide
1. PROTOX-166	Slow	4	XX-4
2. PROTOX-167	Slow	4	XX-4
3. PROTOX-168	Fast	8	Fine-Particle French Process
4. PROTOX-169	Fast	10	Kadox-15

Only PROTOX zinc oxides offer you these important processing advantages:

FASTER INCORPORATION

- Higher density
- Wet readily by rubber
- Minimize variations in rubber batches
- Low moisture pickup

MORE COMPLETE DISPERSION

- Cut mixing time
- Eliminate aggregates that serve as tear centers
- Increase zinc oxide efficiency of activation and reinforcement

SMOOTHER TUBING AND CALENDERING

- Provide an inherent plasticizing effect

All these processing advantages of Protox zinc oxides stem from both the exclusive coating of zinc propionate on the particles and the established high quality of the base oxides.

Which type of Protox zinc oxide do you need for tests?

THE NEW JERSEY ZINC COMPANY

Producers of Horse Head Zinc Pigments

... most used by rubber manufacturers since 1852

160 Front Street, New York 38, N. Y.

HORSE HEAD PRODUCTS

TOP CUTTING

with engraving machines of our own design and manufacture assures

GREATER ACCURACY **HIGHER QUALITY** **FAVORABLE COST**

of

TIRE MOLDS made by BRIDGWATER

Only skilled craftsmen operate these Bridgwater designed and built tire mold Engraving Machines. Yet the precision with which they duplicate tread patterns in a mold cavity are not dependent on the operator alone . . . master cams in each machine serve as a guiding brain to *assure* exact tread design duplication. Together, man and machine make possible the accurate template fit of tread configurations which tire manufacturers the world over appreciate in Bridgwater tire molds.

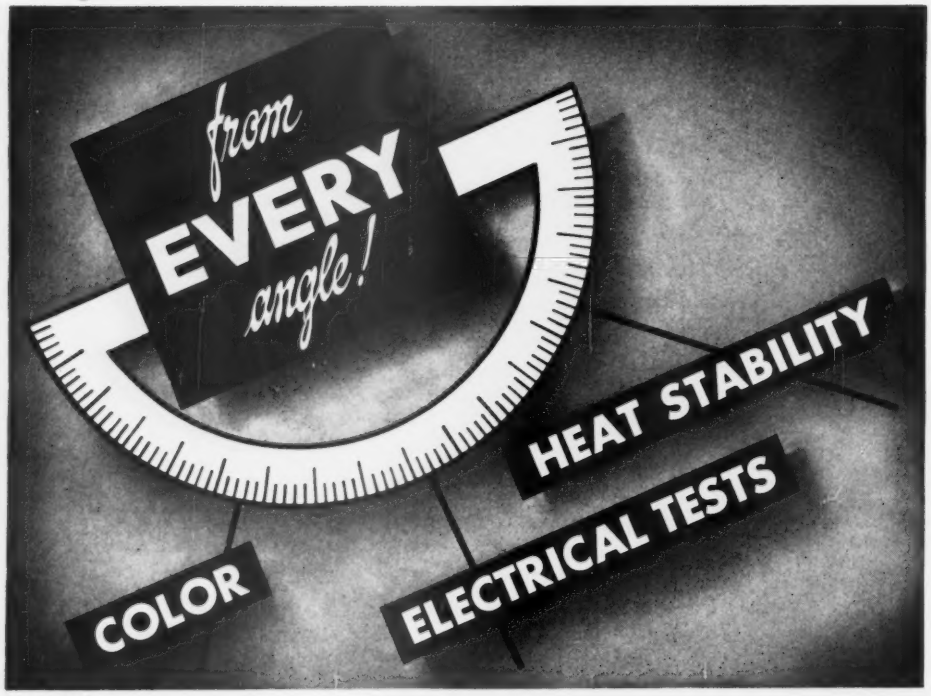
Many of these Bridgwater Engraving Machines, along with other specialized machine tools and equipment — much of it designed by us for the specific purpose — are in operation on the tire mold production lines of our Athens Machine Division in Athens, Ohio. Yet they only typify the whole scope of the skills, experience and facilities Bridgwater makes available to *you*, for faster production of highest quality tire molds — at most favorable cost.

Athens Machine Division

BRIDGWATER MACHINE CO.

AKRON, OHIO

1033



PIGMENT NO. 33

for Compounding

VINYLS AND SYNTHETIC RUBBER

Sample and technical data sent promptly on request

SOUTHERN CLAYS, Inc.

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NEW YORK 6, N. Y.

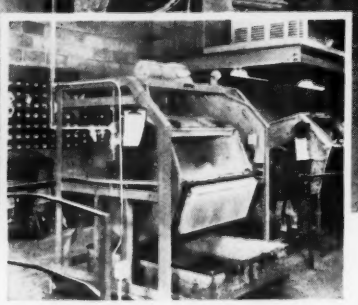
GLYCERIZED
(CONCENTRATED)
LIQUID
LUBRICANT
AN ALL PURPOSE RUBBER LUBRICANT FOR
NATURAL—SYNTHETIC AND RECLAIM STOCKS
COATING FOR SLABS & SHEETS
EXTRUDING
MOLD RELEASE
WASHING AND FINISHING
MANDREL AND CORE LUBRICANT
BELT DRUMS
AVOIDING SET-UP STOCK
AIR OR WATER BAGS
GLYCERIZED LUBRICANT
HIGHLY CONCENTRATED
1 drum makes up to 50 drums of working solution
GENESEE BROTHERS
RUBBER MATERIALS DIVISION
West 44th Place and Whipple Street
Chicago 32, U.S.A.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND

AN AIR REDUCTION PRODUCT

the magic of CO_2...

Tumbling under way . . . Carboflex system for dispensing liquid. CO_2 with Pureco's 12-ton receiver on balcony above tumblers.

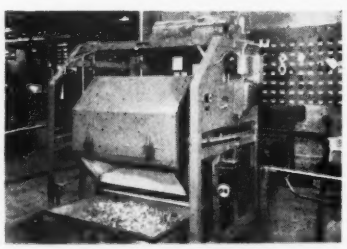


Tumbling completed . . . barrel ready to be unloaded. Interior dome to right houses thermostat control.

for faster deflashing at lower cost

Pictured here is CO_2 at work getting rid of flash on molded rubber pieces via the tumbling process. Pureco liquid CO_2 is used in this operation—however, carbon dioxide as either a liquid or solid can be employed in finishing small rubber articles. Deflashing by tumbling means lower cost and faster production. For information about convenient, *adaptable* CO_2, write to Pureco.

(all photos courtesy of satisfied user, Ohio Rubber Company, division of Eagle Picher Corp., Willoughby, Ohio)



Barrel unloaded . . . note frost on frozen pieces which have been deflashed, ready for separating and washing.

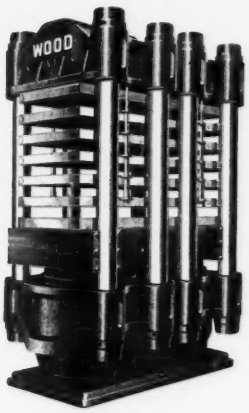
PURECO

Pure Carbonic Company

GENERAL OFFICES: 60 EAST 42ND STREET, NEW YORK 17, NEW YORK

A DIVISION OF AIR REDUCTION COMPANY, INCORPORATED

How long are nine lives?



The amazing ability of cats to survive what might be called "punishing service conditions" has given rise to the 9-life theory. How long a period this is nobody really knows. That's the way it is with R. D. Wood hydraulic presses . . . their life seems limitless, too. Some of them are scarcely beginning to draw their second wind after 25 years in service. Others are still going strong at 50. What every owner knows for certain about his R. D. Wood presses is that they have no trouble outliving the time needed to earn the original investment . . . and then some. An informative catalog is available.

IN RUBBER AND PLASTICS, THE PAYOFF'S AT AN R. D. WOOD PRESS LIKE THIS ONE!

This 1,327-ton multiple-opening hydraulic press is used for the manufacture of molded brake lining and similar products. Can be furnished in various sizes and capacities to meet production needs. R. D. Wood presses are made for use in many industries. Ask for catalog, and for engineering aid—both yours without obligation.

R. D. WOOD COMPANY

PUBLIC LEDGER BUILDING • PHILADELPHIA 5, PENNSYLVANIA

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MAKERS OF HYDRAULIC PRESSES AND VALVES

FIRE HYDRANTS

CAST-IRON PIPE

GATE VALVES

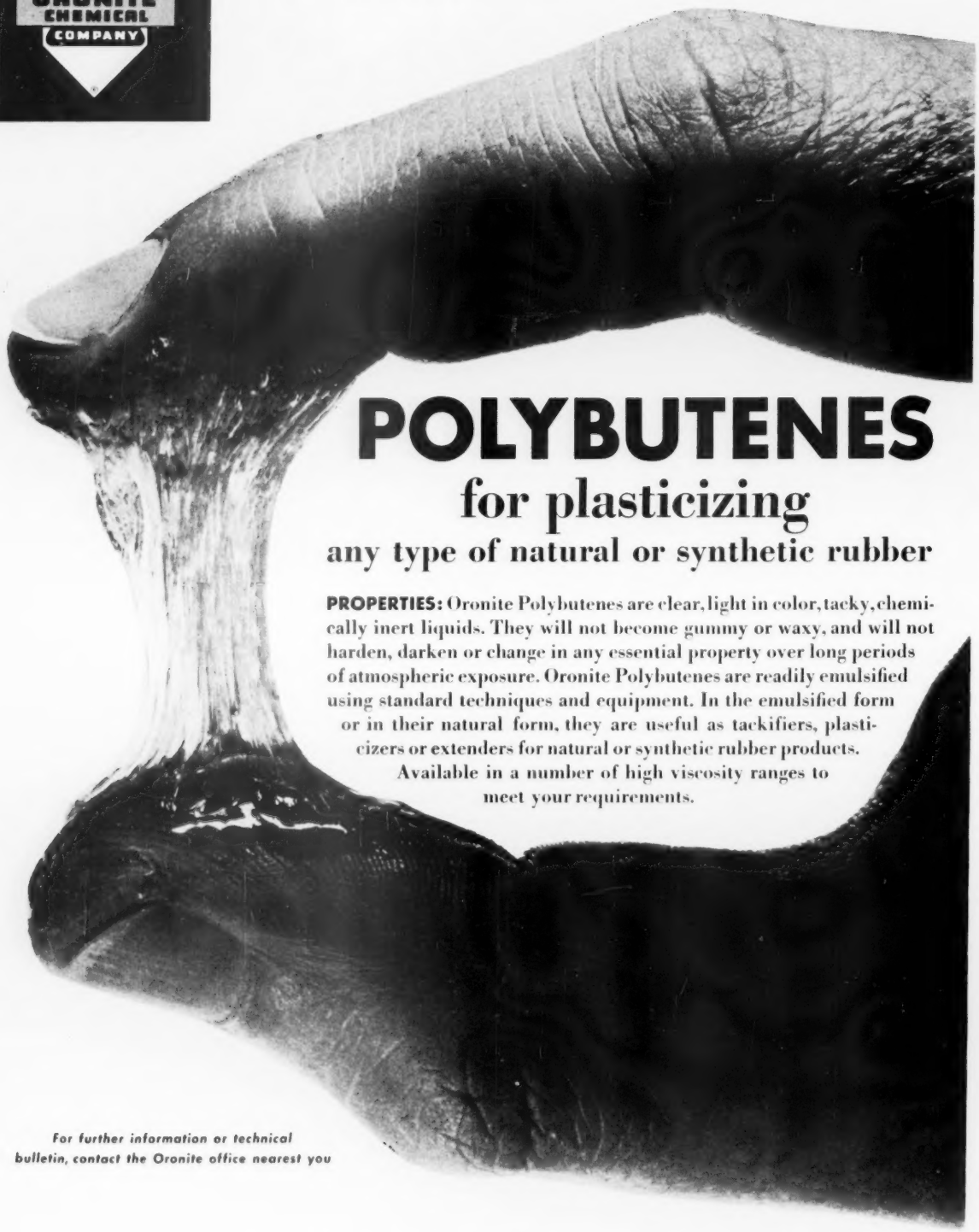
GAS PRODUCERS

ACCUMULATORS

ORONITE CHEMICAL COMPANY

Original and Major source of supply!

(Oronite Polybutene was first produced and sold in 1935)



POLYBUTENES

for plasticizing

any type of natural or synthetic rubber

PROPERTIES: Oronite Polybutenes are clear, light in color, tacky, chemically inert liquids. They will not become gummy or waxy, and will not harden, darken or change in any essential property over long periods of atmospheric exposure. Oronite Polybutenes are readily emulsified using standard techniques and equipment. In the emulsified form or in their natural form, they are useful as tackifiers, plasticizers or extenders for natural or synthetic rubber products. Available in a number of high viscosity ranges to meet your requirements.

For further information or technical bulletin, contact the Oronite office nearest you

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THIS PLASTISOL EXPANDS UNDER HEAT AT ATMOSPHERIC PRESSURE TO FORM A VINYL SPONGE

Sponge Plastisol is a recent development in the versatile family of flexible plastisol products.

Spraying:

Sponge Plastisol may be sprayed to flat, vertical or curved surfaces. Varied uses as sound deadening or insulation against heat or cold on refrigerators, air-conditioning units, automotive bodies may be obtained.

Spreading:

Spread coating on textile or paper stock, etc. may be accomplished with Sponge Plastisol.

Molding:

Sponge Plastisol may be poured into molds to form arm rests, crash pads, gaskets, squeeze balls, etc.

Dip Coating:

Dipping of wire baskets, etc. to insulate against shock is a typical application of Sponge Plastisol.

The Watson-Standard laboratories have formulated compounds for many end uses and methods of application. We will assist you with your problems.

Watson-Standard CO.

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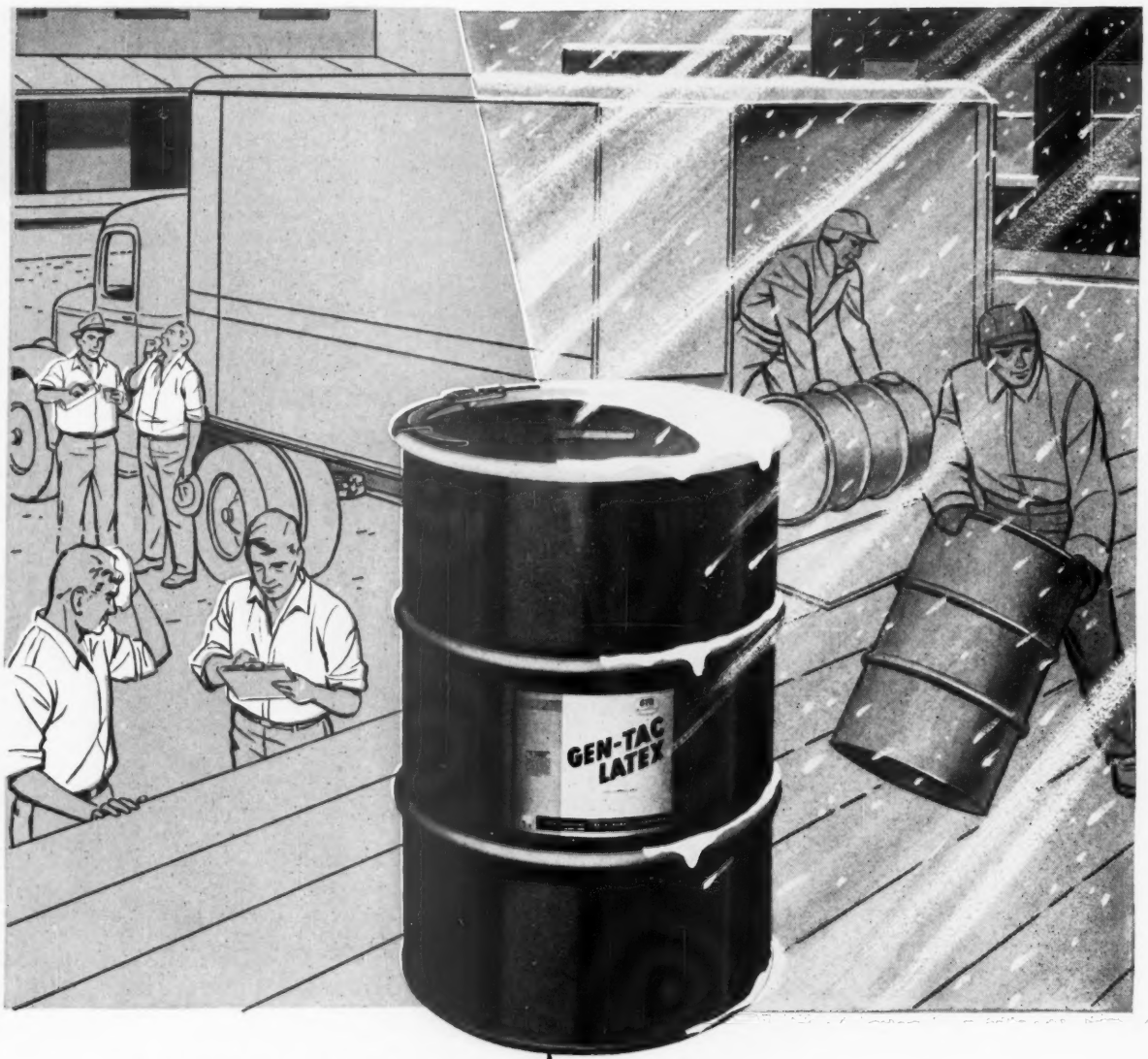
Announcing—



KURE-BLEND® MT MASTERBATCH.
50% TETRAMETHYL THIURAM DISULFIDE AND 50% GR-S TYPE RUBBER

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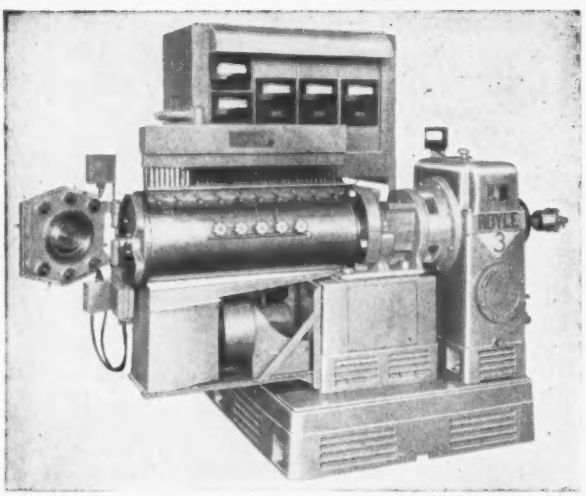

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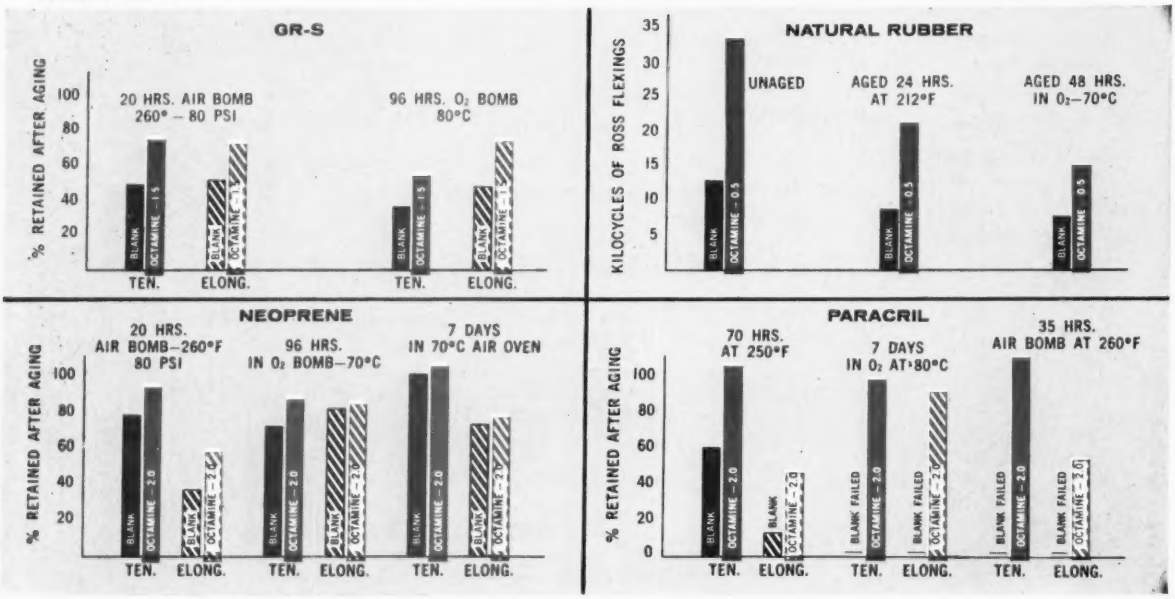

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RUBBER AGE

Vol. 75, No. 6 SEPTEMBER, 1954

Swelling and Drying of Fuel O-Rings

By R. A. CLARK and R. M. KELL

Battelle Memorial Institute, Columbus 1, Ohio

AN investigation was made of the rates of swelling and drying of unconfined and confined fuel O-ring packings at various temperatures. The object of this work was to explore the possible shortening of a lengthy fuel O-ring test procedure (Specification MIL-P-5315) by employing higher swelling and drying temperatures.

Most of the previous work by other investigators on the swelling of rubber does not appear to be directly related to this problem. Some of the work reported has been fundamental in nature, dealing with such problems as the free energy of mixing of solvent and polymer, internal pressures, and relations between the degree of crosslinking and swell. These theoretical treatments of the interactions between polymers and solvents have been aimed chiefly at explaining the chemical nature of polymers, rather than in predicting rates of swell of polymers in particular solvent systems. Somewhat more practical approaches to the problem of rubber swell have been made, but, unfortunately, the data are not considered applicable to the fuel-type O-rings under consideration.

Procedures

Two different size O-rings from five different commercial sources were used in this study. The small packings (AN 934-8) have a nominal inside diameter of 0.362 inch and cross-sectional diameter of 0.103 inch, while the larger size (AN 934-27) has corresponding dimensions of 1.484 and 0.139 inch, respectively. All O-rings had Paracril 18-80 as their base polymer, although small amounts of other rubber might have been included in some of them. They are all reinforced with carbon black and contain plasticizer to improve their low-temperature properties. The swelling fluid was a 70:30 isooctane-toluene mixture (MIL-H-3136, Type 3) and was used in a weight ratio to the O-rings of about 25 to 1.

The rates of swelling of both confined and unconfined O-rings were studied. The confined O-ring swelling tests were conducted with O-rings retained in the special jig shown in Figure 1, which simulates the piston-cylinder portion of a test jig described in MIL-P-5315. The gland of this jig provides for an initial compression of about 13 percent, measured as reduction in O-ring cross-sectional diameter. Both in the tests where the O-rings were confined and where they were not confined, the samples were in total contact with fluid inside 8-ounce glass bottles fitted with aluminum-lined screw caps.

Different sets of O-rings were maintained at −65, 32, 78, 120, 160, 212, and 250°F. for times up to 700 hours, depending on the time necessary to reach equilibrium swell. The amount of swell was determined on duplicate samples, following ASTM Method D380-46T.

Note: This paper was presented before the Rubber and Plastics Division, American Society of Mechanical Engineers, Pittsburgh, Penna., June 22, 1954.

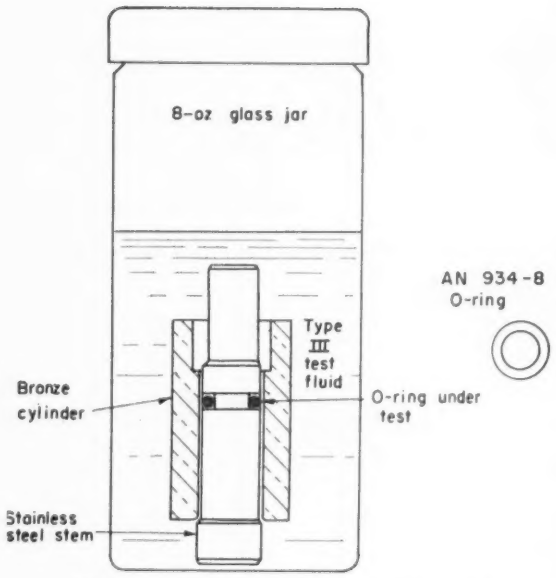

FIG. 1—Sketch of confined swelling jig.

The dry-out tests on preswelled O-rings were carried out in a circulating air-type oven, set at temperatures of 120, 160, 212, and 250°F.

All analytical weighings to determine volume change during swelling and drying were conducted as rapidly as possible, in order to avoid evaporation weight losses during the process of weighing.

Swelling Results

General Aspects: In Figures 2 and 3 are shown typical curves obtained for the unconfined swelling of two sizes of fuel-type O-rings in Type 3 fluid at various temperatures. The effect of confining the smaller size O-ring (AN 934-8) on its swell under otherwise similar conditions is shown in Figure 4. It can be observed from these data that the amount of maximum and final or "equilibrium" swell is essentially independent of the temperature employed when the O-rings are not confined, but that some deviations occur when the O-rings are restricted in a packing gland.

TABLE I—SUMMARY OF DATA FOR SWELL OF O-RINGS IN TYPE 3 FLUID

	Volume Increase in Per Cent			
	Unconfined O-Rings		Confined O-Rings	
O-Ring Source	Maximum Swell	Equilibrium Swell	Maximum Swell	Equilibrium Swell *
1	36.5	31.0	30	22.5-30
2	57.0	52.5	42	41-50
3	50.0	41.5	40	32-42
4	38.0	30.0	34	25-33
5	38.0	30.0	31	21-33

* Varies with temperature.

In this study, similar data were obtained for O-rings from five different sources. The data for these are summarized in Table I. The differences in the swell of O-rings from these various sources are attributed to variations in their composition, with the dominant compounding factors being the choice and amounts of polymer, plasticizer, and carbon black. The rise to a maximum, evident in swelling curves of this type, is the result of the rubber polymer being swelled more rapidly than the plasticizer is lost by extraction during the initial fuel-immersion period, while the decline in swell after the maximum is the result of additional plasticizer being lost more rapidly than the rubber polymer is swelled. When equilibrium is reached, polymer swell and plasticizer extraction are essentially completed and in balance.

None of the curves showed the existence of a swelling increment, defined by Scott *(5)* as a steady volume increase resulting from the oxidative breakdown of rubber. Even after immersion periods of over 700 hours at 78°F., the swell volume remained essentially constant. In the case of two samples aged more than 14 months at this same temperature, there actually was a small decrease in the "equilibrium" volume, presumably due to an increase in the number of polymer cross-links produced by aging and to the gradual extraction of materials other than plasticizer, such as low molecular weight fractions of the rubber, antioxidant, and residues from the accelerator employed.

Effects of Temperature: It has previously been men-

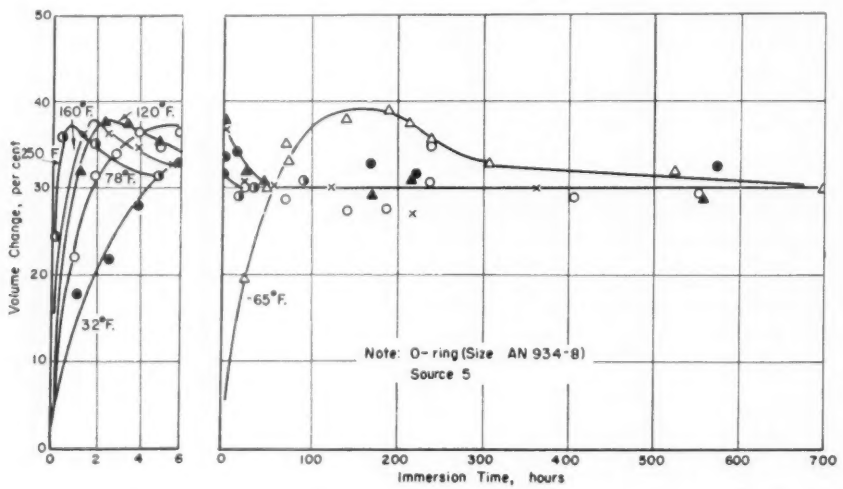

FIG. 2—Swelling of unconfined O-rings in Type 3 fluid at various temperatures.

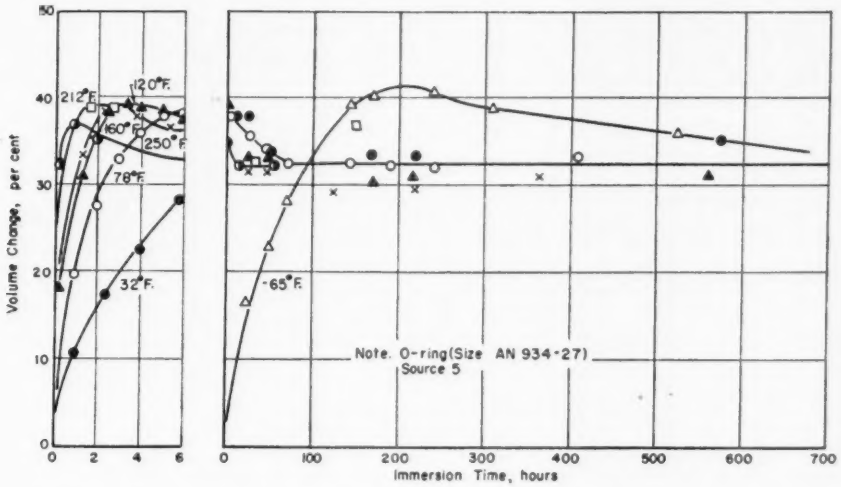

FIG. 3—Swelling of unconfined O-rings in Type 3 fluid at various temperatures.

tioned that temperature had little effect on the amount of swell obtained. This was found to be the case for the particular rubber-solvent system investigated. Since the solvent system employed contained 30 percent toluene and 70 percent isooctane (i.e., 2,2,4-trimethylpentane), it was thought possible that these two fractions might individually swell rubber differently at various temperatures, with the actual result being an additive effect. Support for this possibility appeared in the work of Salamon and Van Amerongen *(4)*, who observed a negative coefficient of swell for an acrylonitrile-type rubber immersed in toluene, but a positive temperature coefficient when heptane was the swelling medium. Similar cases have been reported elsewhere in the literature, and are explained on the basis of good and poor solvents acting differently.

Results obtained with the individual solvents, toluene and isooctane (examples of good and poor solvents, respectively), are shown in Figure 5. These data show that toluene has a negative temperature coefficient for the swell of fuel O-rings, while isooctane showed no temperature dependence in similar tests. The additive effects, if present, are not apparent in the swelling of the rubber samples in the 30:70 toluene-isooctane mixture. If there is a small temperature dependence of swell, this dependence does not appear to be a linear relationship to the relative amounts of solvent employed. A further study of other solvent ratios has not been made to determine the nature of the relationships involved. Such a study would be interesting to conduct, but was not within the scope of this present work.

The time required to obtain maximum and equilibrium swell was determined with reasonable accuracy by plotting the swell data on semilog coordinates, such as is illustrated in Figure 6. In such plots, the maximum swell is sharply indicated by a sudden change in slope of the straight-line curves from increasing volume to decreasing volume, while final or equilibrium swell is evident as the point at which these curves cease their downward progress and level off. The times required to reach maximum and equilibrium swell were determined in this manner for five O-ring sources, with nearly the same result for each source. These data were then composited and plotted against temperature in Figures 7 and 8. It is obvious from these two figures that an increase in temperature drastically accelerates the rate of swelling.

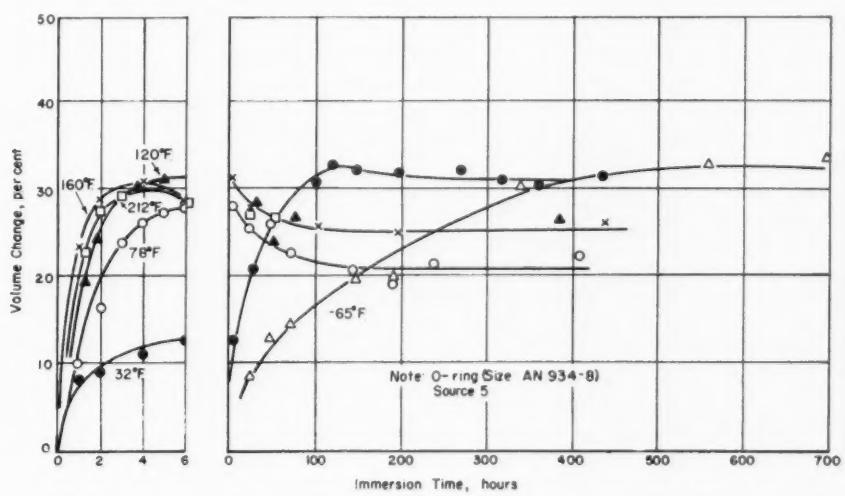

FIG. 4—Swelling of confined O-rings in Type 3 fluid at various temperatures.

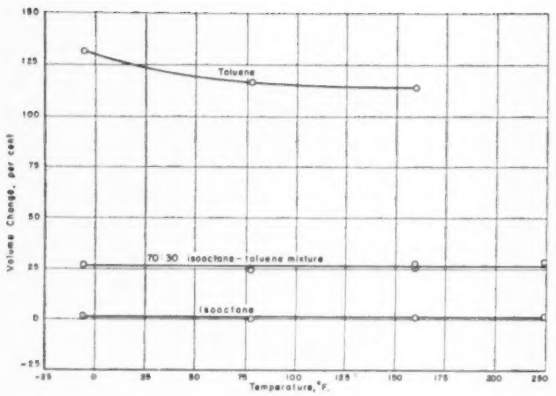

FIG. 5—Effect of type of fluid on temperature dependence of O-ring swelling

Thus, at −65°F., about 25 days were needed to reach equilibrium swell, whereas at 250°F., less than 24 hours accomplished the same result.

The larger size O-rings took a somewhat longer time to attain maximum and equilibrium swell. This was expected, as the processes of swelling and extraction are dependent on the ratio of surface area to volume of the rubber and the internal rubber distance through which diffusion must take place.

Effects of Confinement: The O-rings that were confined in a packing gland (under about 13 percent cross-sectional squeeze or compression) were found to swell from 5 to 10 percent less than unconfined samples of the same size and source. Results for this comparison are shown in Table I and in Figures 2 and 4. These findings are in agreement with studies made by Flory *(1)*, Gee *(2)*, and Treloar *(6)*, who have reported that rubber under tension should swell more, but under compression should swell less than when it is unstressed.

While the net effect of confining an O-ring in a gland is obviously one of compression in this instance, it is well to point out that certain parts of the O-ring may simultaneously be under tension. For example, the flattening of a packing tends to bulge and stretch the sides not touching the surfaces of the packing gland. Another example of stretch in a confined packing is when the inside diameter of a gland is greater than the inside diameter of the packing, a condition which is quite customary though deplored for some O-ring applications *(3)*. Thus, it would be necessary to make a complete stress analysis of a packing in order to determine a true relationship between the amount of compression and swell.

The swelling curves for confined O-rings differ from those of unconfined samples, but the contour of the individual curves is approximately the same. Although the confined samples had nearly the same maximum swell at various temperatures, they displayed more divergence in equilibrium swell with temperature. The general, though not consistent, tendency was for the swell of confined O-rings to decrease with increase in temperature. One factor which may have contributed to this is that rubber has a higher thermal coefficient of expansion than metal. Thus, at higher temperatures, rubber is subjected to a greater degree of compression, which is a force tending to reduce the amount of swelling.

The inconsistencies in results for swelling confined O-rings are probably due to the poor contact of the fluid with the O-ring. The confining walls of the packing gland limits the actual surface of the rubber that is in direct contact with the fluid. Further irregularities in results arise from the gland limiting the volume of fluid that is in contact with the O-ring. One would expect a build-up of plasticizer (from the O-ring) in the fluid within the gland. The reduced circulation of fluid from the gland to the main part of the fluid outside would favor this condition. Since the nature of the swelling medium is one of the dominant factors in rubber swell, deviations in the composition of this medium would be expected to give widely variant results.

Drying Results

An investigation also was made of the time required for O-rings preswelled in Type 3 fluid to dry out at various temperatures. The drying temperatures employed were 120, 160, 212, and 250°F. The O-rings were preswelled at room temperature for this study. The preswelling temperature was considered to have little effect on the rate of dry-out, since the swelling studies had indicated comparable amounts of swell can be obtained for a number of different temperatures.

In Figures 9 and 10 are shown results for drying un-

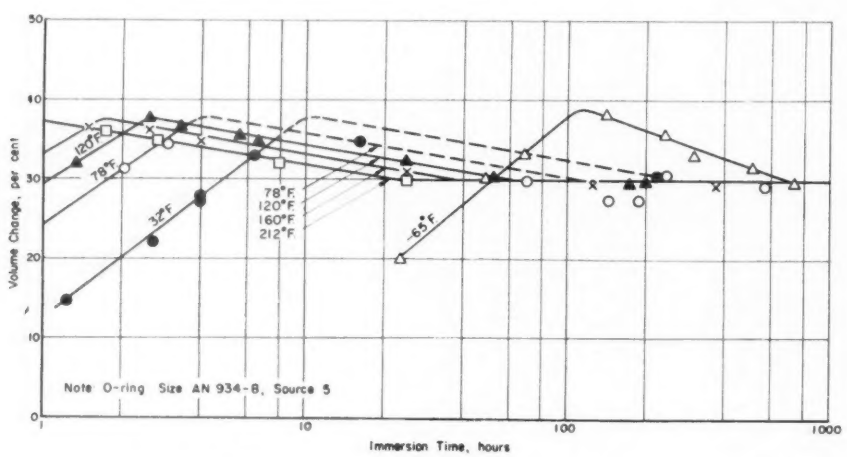

FIG. 6—Semi-logarithmic plot of volume change versus immersion time at various temperatures for O-rings.

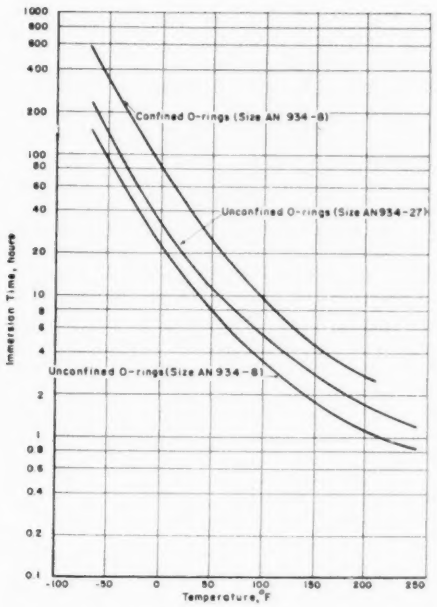

FIG. 7—Immersion time required in Type 3 fluid for O-rings to reach maximum swell at various temperatures.

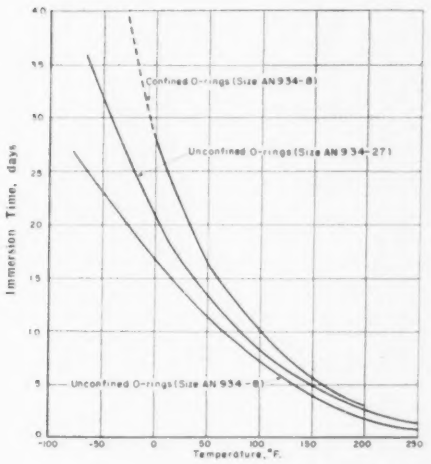
Confined O-rings (Size AN 934-8)
Unconfined O-rings (Size AN 934-27)
Unconfined O-rings (Size AN 934-8)
Immersion Time, days
Temperature, °F

FIG. 8—Immersion time required in Type 3 fluid for O-rings to reach equilibrium swell at various temperatures.

confined and confined O-rings from one typical source, while in Table II are summarized similar data for O-rings from five selected sources. The general conclusion which is evident from these data is that higher temperatures accelerate the rate of dry-out but have little influence on the final dry-out volume, provided identical pretreatment is given the O-rings before drying.

The phenomenon of drying is known to be a combination of both diffusion and evaporation. Temperature affects both the rate at which liquids can be diffused to the surface of an O-ring and the rate at which they can be evaporated from the surface. The extent to which either of these become the controlling factor will depend on a number of factors, including the temperature, the nature of the material which is lost during drying (such as its viscosity and vapor pressure), the nature of the material from which it is being lost, and the air velocity of the oven. At higher temperatures, the rate of diffusion probably becomes the controlling factor, due to the rapidity with which a volatile solvent can be vaporized when its boiling point is approached or exceeded.

The greater volume loss of O-rings preswelled to equilibrium than those preswelled only to maximum swell was anticipated. The difference is attributed to plasticizer remaining in the O-rings when it was partially extracted and has been used to account for the presence of a maximum in the swelling curves. It was shown in Table I that the maximum swell averaged about 7 percent higher than the equilibrium swell. This is essentially the same difference in shrinkage obtained for O-rings given these two types of pretreatment and then dried to constant weight.

The dry-out tests made on O-rings while confined in packing glands showed that confinement reduced the rate at which equilibrium was reached, but did not appreciably alter the final volume attained. Confinement, of course, would reduce the diffusion rate of solvent to an exposed surface and its rate of evaporation from that surface.

New O-rings which were not preswelled or extracted were given similar oven-heating treatment to determine

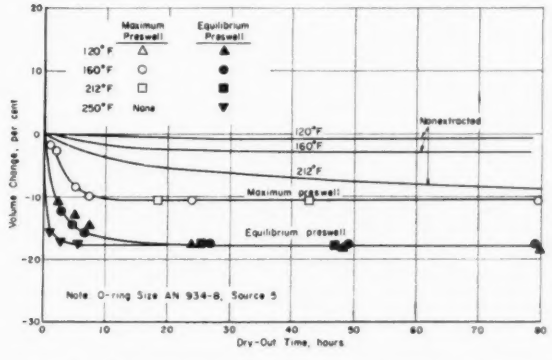

FIG. 9—Dry-out at various temperatures of unconfined O-rings, preswelled in Type 3 fluid at room temperature.

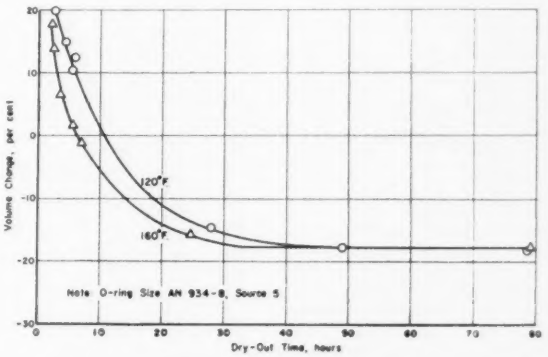

FIG. 10—Dry-out at 120° and 160°F. of confined O-rings, preswelled to constant volume in Type 3 fluid at room temperature.

TABLE II—EFFECT OF OVEN DRYING PRESWELLED O-RINGS TO CONSTANT VOLUME*

O-Ring Source	Per Cent Shrinkage Based on Original Volume: Unconfined O-Rings, Maximum Preswell	Unconfined O-Rings, Equilibrium Preswell	Confined O-Rings, Equilibrium Preswell
1	9.5	15	13.5
2	12.0	17	—
3	11.5	19	18.0
4	10.0	18	18.0
5	10.5	18	18.0

* Essentially temperature independent for temperature range studied (120-250°F.).

the loss of plasticizer and other volatile materials from such O-rings. The volume change of these O-rings for various heating times is plotted in Figure 9 for oven temperatures of 120, 160, and 212°F. At higher temperatures, there was more volume loss than at lower temperatures. Such losses would be greatly affected by the type and amount of plasticizer or plasticizers in a particular rubber composition. While there are some plasticizers which are relatively permanent when subjected to heat alone, the combination of fuel extraction and heating probably would be relatively efficient in removing much of the low temperature-type plasticizers needed for fuel O-rings.

Physical Properties

A brief investigation was made to determine whether the use of higher temperatures to extract and dry O-rings might have harmful effects on the rubber. The aging of rubber, of course, is accelerated by advancing the temperature. The higher the temperature, the shorter the time required to accomplish the same degree of degradation, as usually measured by change in stress-strain properties of the rubber. The question is whether the shorter time necessary to accomplish the swelling and drying of an O-ring at 250°F. produces similar changes in rubber that are obtained for a longer time period at 212°F., or for a still longer time period at 160°F.

In Table III are tabulated the physical properties of O-rings after they were given various types of treatment at these three temperatures. Both the swell and the dry-out were carried to equilibrium conditions. Figure 8 was used to obtain the time necessary to attain equilibrium swell, while the time for equilibrium dry-out was obtained by drying these equilibrium preswelled O-rings to constant volume at the same temperature. Slightly higher tensile strengths, but essentially the same elongations, were obtained on O-rings treated for shorter times at the higher temperatures. These data indicate that there is little evidence of serious degradation by the shorter time treatment of O-rings at the higher temperatures.

The effect of extending the drying or oven aging of O-rings at these three temperatures also is shown in Table III, as well as data for aging O-rings without prior extraction and drying. Time intervals for 212° and 250°F. were selected which would be comparable to 168 hours at 160°F. The arbitrary assumption was made that the rate of aging would follow the general rule for most organic reactions, i.e., that the rate of reaction doubles for each 10°C. or 18°F. This assumption is not entirely valid in the case of rubber, due to the complexity of thermally induced reactions involved, such as continued vulcanization, cross-linking, and chain scission. However, the times selected are believed to provide a reasonably fair basis for comparison.

For continued heating, higher temperatures produced both higher tensile strengths and lower elongations. Insofar as O-rings are concerned, the retention of elongation is of prime importance. A minimum elongation of 150 percent is usually considered necessary for the installation of an O-ring. These data indicate that, under the stipulated conditions of comparison, 250°F. appears quite feasible as a temperature for preconditioning O-rings.

It is well to point out that equal times of heating at

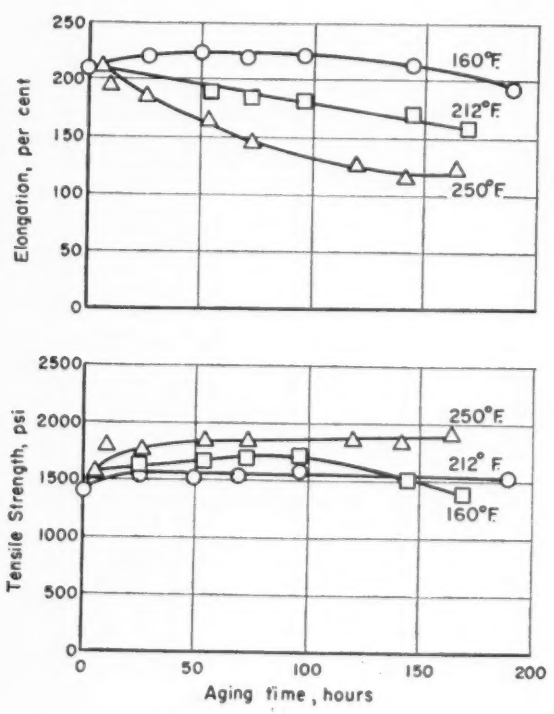

FIG. 11—Oven aging of O-rings previously swelled to equilibrium conditions at the same temperature.

TABLE III—EFFECT OF VARIOUS TYPES OF AGING ON PHYSICAL PROPERTIES OF O-RINGS*

Temp. (°F.)	Time of Swell (hours)	Time of Dry-Out (hours)	Time of Aging (hours †)	Tens. Str. (psi)	Elong. (%)
Initial Properties				1410	210
Oven Aged Only					
160	—	—	168	1350	205
212	—	—	42	1570	185
250	—	—	5	1460	190
Swelled and Dried Only					
160	103	21	—	1495	210
212	53	13	—	1500	195
250	24	5	—	1570	210
Swelled, Dried and Aged					
160	103	21	168	1550	195
212	53	13	42	1620	200
250	24	5	5	1800	195

(*) AN 934-27 size O-rings, Source 5. (†) Does not include time for dry-out, shown in previous columns.

higher temperatures do degrade rubber properties more, as is evident in Figure 11. The data shown in this figure demonstrate that extended heating at 250°F., beyond that necessary to swell and dry the O-rings, is especially harmful to the elongation of the rubber. However, this particular composition does show a remarkably good retention of tensile strength at this temperature. Therefore, it might remain serviceable for some time at 250°F. provided it does not have to be stretched to remove or install it after treatment of this type.

Summary

The purpose of this investigation was to shorten a fuel O-ring test procedure by using temperatures up to 250°F. to accelerate the rates of O-ring swelling and drying. Free and confined samples from five commercial sources were immersed in 30 percent aromatic fuel at temperatures from −65° to 250°F. until equilibrium swell was attained. Equilibrium preswelled O-rings were then dried at oven temperatures of 160°, 212°, and 250°F. until equilibrium dry-out was reached.

It was found that the swell of these O-rings was accelerated by advancing the temperature with very little effect on the maximum or final swell obtained. Likewise, increasing the temperature speeded up drying with little effect on final volume. The physical properties of O-rings treated at 250°F., by swelling and drying to equilibrium conditions, were comparable in most respects to O-rings given similar (though longer) treatment at 160° or 212°F.

It is suggested that the rate of testing fuel O-rings can be accelerated by using 250°F. as a test temperature. This does not imply that O-rings tested in this manner are necessarily satisfactory for extended use at this temperature.

ACKNOWLEDGMENT

The work described in this paper was carried out in connection with a research project sponsored by the Wright Air Development Center, Wright-Patterson Air Force Base. Any opinions expressed here are those of the authors and do not necessarily represent those of the Wright Air Development Center.

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Important Steps in Closed-Cell Rubber Manufacture

INCLUDED among the many forms of assistance offered by Rubatex Products, Inc., to its licensees is a "News-Letter" in which various technical suggestions are contained. These "News-Letters" are prepared by Dr. R. J. Noble, vice-president in charge of research and development, who makes his headquarters at the company's laboratories at 27 Upham St., Melrose 76, Mass. The following data on the important steps in closed-cell rubber manufacture are taken from one of the company's recent bulletins.

Recipe: The choice of any one recipe in preference to another is probably far less important in the production of a satisfactory expanded rubber article than are the processing details. However, efforts to reduce costs should not rule out due consideration of the effect of each ingredient on the processing characteristics of the compound, nor on the quality of the finished product.

Mixing Operation: Whatever the recipe, the greatest care must be taken to insure uniformity as to composition from batch to batch. The object of this operation is to obtain a homogenous mass in which the best possible dispersion of each constituent is obtained. If this condition is not realized, small blisters or holes will usually be found in the finished product. The temperature of mixing must be given proper consideration. Depending upon the order of adding ingredients, inadequate control of time and temperature of mixing may lead to rough stock, loss of blowing agent and low expansion.

Relaxation of Compound: While it is an old practice in the industry to allow a suitable relaxation period after the compound is mixed, some manufacturers fail to observe this precaution. As a means of promoting uniformity in both subsequent processing steps, it should not be overlooked.

Calendering Operation: The most important consideration in calendering is that of maintaining a low temperature on the calender rolls. In general, the temperature should not exceed 170°F. and in any event must be well below the minimum temperature at which the blowing agent first begins to decompose. Otherwise, there will be loss of blowing agent and blisters may be formed within and between the plies.

Press Operation: The necessity of maintaining uniform mold temperatures cannot be over-emphasized. Variations in temperature, as between presses, or as between platens in the same press, can lead only to variations in the density, hardness, size and shrinkage of the molded product. The pressure on the molds must be adequate for the internal pressure developed. Molds must be slightly overloaded to obtain a small amount of flash to seal the mold, assuring a closed-cell structure. In multi-deck presses, provision should be made for rapid opening which minimizes variations in expansion and deformation of the article.

Heat Treatment: The heat applied to the expanded article must be sufficient to bring about full stabilization and must be determined for each case by suitable tests. Inadequate heat treatment will result in shrinkage in storage or after receipt by the customer.

In the next issue—first in a series on the European rubber industry!

Effect of Active Hydrogen on the Breakdown of Oil-Masterbatched Polymers

By W. K. TAFT, A. D. SNYDER and J. DUKE

Government Laboratories, University of Akron, Akron, Ohio

THE use of petroleum oils as extenders for high viscosity cold GR-S, besides offering the economic advantage of providing more rubber by replacing a portion of the polymer with low viscosity inexpensive oil, also offers a means of controlling breakdown of the polymer molecule during processing by the proper selection of the oil. It has been shown *(1)* that the nitrogen bases and the aromaticity of the oils contribute to the breakdown of the polymer. The power consumption during processing of the oil-polymer masterbatch was also shown to be decreased as the aromaticity increased. The work reported herein was undertaken to attempt to define more exactly the chemical constituent in the oil, besides the nitrogen bases, that contribute to this breakdown.

The previous work referred to above has shown that generally greater polymer breakdown occurred during heat aging in air than in a nitrogen atmosphere, although the presence of air was not necessary to promote breakdown. Addition of a peroxide to two oils of differing types resulted in differing effects—accelerating or inhibiting—upon the rate of breakdown of the polymer in both air and nitrogen.

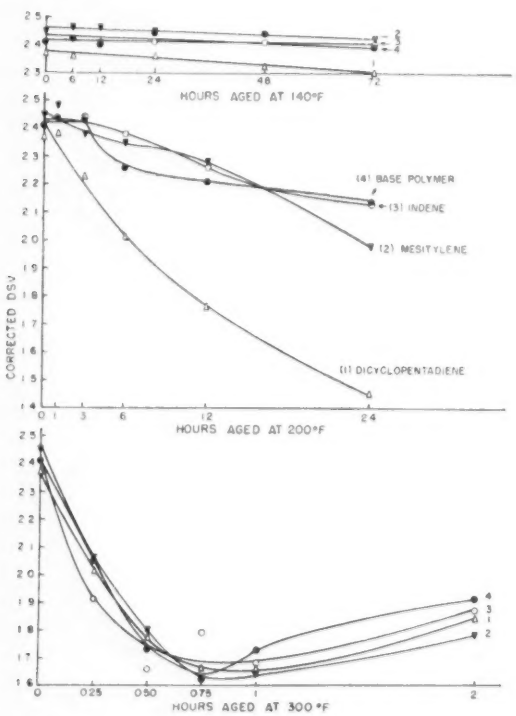

FIG. 1—DSV changes of masterbatches heat aged at 140°, 200° and 300°F.

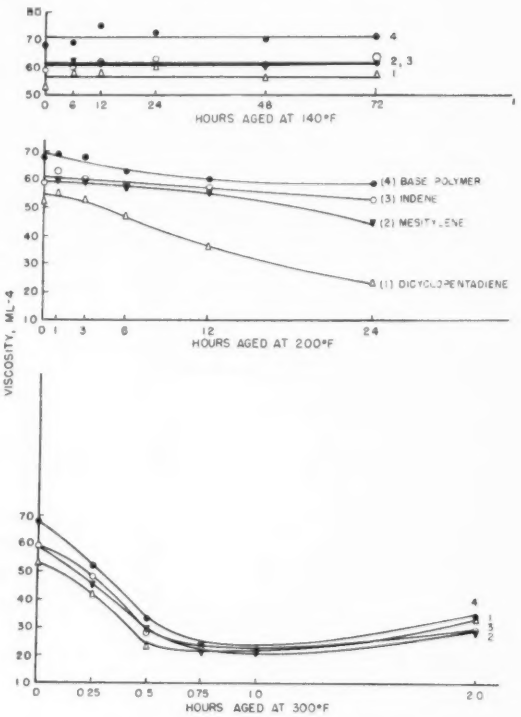

FIG. 2—Mooney viscosity changes of masterbatches heat aged at 140°, 200° and 300°F.

In an investigation of reclaiming agents, le Beau *(2)* found that the reclaiming effectiveness of various hydrocarbons present in coal tar naphtha followed the autoxidative susceptibility (peroxide formation) of the individual hydrocarbon. As reclaiming effectiveness is essentially the degree of polymer breakdown, and as the susceptibility to autoxidation has been thought to be generally similar to the rate of formation of peroxides in, and the addition of oxygen to, polymer during breakdown, three of the materials investigated by Le Beau—indene, mesitylene, dicyclopentadiene—were latex masterbatched.

In addition, a sample of alkylated bottoms, which are the heavier fractions resulting from the production of isooctanes by an alkylation process and obtained from a commercial oil refiner, was blended with Circosol-2XH and Dutrex 20, and the polymer masterbatches of these blends compared with masterbatches containing the original oils. These alkylated bottoms appear to contain

an active constituent that might be regarded as active hydrogen, as indicated by the increase of bromine absorption in twenty hours compared with the usual rapid addition of bromine as would occur in the presence of double bonds. The indication of active hydrogens was also found by infrared spectra *(3)*.

It is evident that commercial oils may or may not contain constituents which accelerate or inhibit the oxidation or breakdown of polymer by air or peroxides *(1)*. It was not known whether active hydrogen attached to carbon would accelerate or inhibit breakdown of masterbatches under oxidative conditions at relatively low temperatures, because the materials containing this activity were used by le Beau under steam pressure at about 382°F. Various oils and hydrocarbons used in this and related work have been demonstrated to vary in their oxygen absorption to form peroxides, and because the active hydrogens are known to be reactive towards oxygen, the term "active hydrogen" has been used in this sense in this paper.

Procedure

Latex was made according to GR-S-1500 type formula. The contained polymer had a viscosity of 77 ML-4 and was gel free. Masterbatches for the first series of tests were made to contain 10 parts of dicyclopentadiene, mesitylene or indene per 100 parts of polymer. All these materials were freshly distilled at their proper distillation ranges. The wet crumb was dried in a forced-air oven at 140°F. to a maximum moisture content of 0.5%. The antioxidant was 1.25% of phenyl-beta-naphthylamine, based on the base polymer.

Another series of masterbatches was prepared from a base latex containing gel-free polymer of 160 ML-4 viscosity. This latex was masterbatched with 50 parts of either Circosol-2XH or Dutrex 20 alone or with a

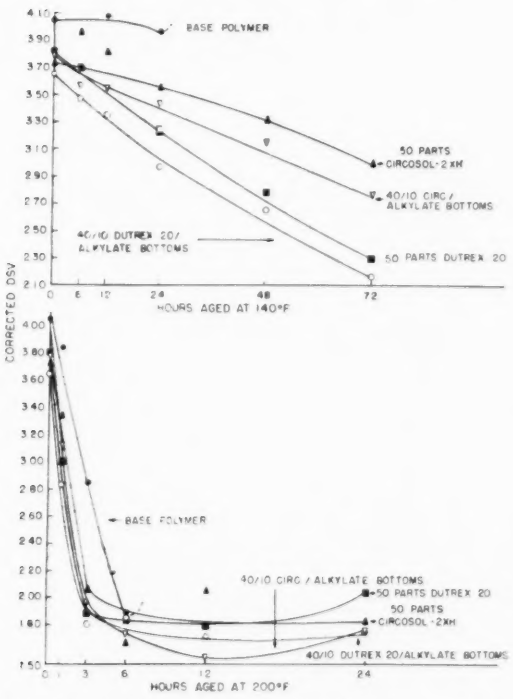

FIG. 3—DSV changes of masterbatches containing commercial oils and blended with 20% of the alkylated bottoms heat aged at 140° and 200°F.

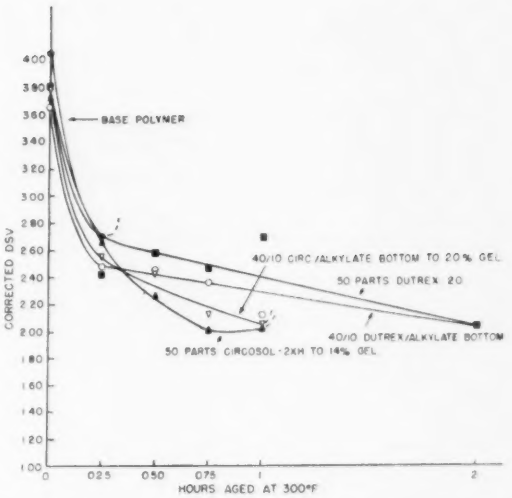

FIG. 4—DSV changes of masterbatches containing commercial oils and blended with 20% of the alkylated bottoms heat aged at 300°F.

40/10 mixture of each of these oils and the alkylated bottoms. The antioxidant was 1.50% of Wing-Stay S, a mixture of alkylated phenols.

All masterbatches and base controls were aged in a forced-air oven for various periods of time at 140°, 200°, and 300°F. The Mooney viscosity, gel content, dilute solution viscosity and the content of acetone extractables were determined for each sample before and after aging. The DSV of the contained polymer was calculated from the determined viscosity of each sample as follows:

$$\text{Polymer DSV} = \frac{\text{Determined DSV}}{\text{100-acetone extract, \%}} \times 100$$

Results and Discussion

The dilute solution and Mooney viscosity changes with time of heating at 140°, 200° and 300°F. are shown in Figures 1 and 2, respectively. It is evident that as the reactivity of the hydrocarbon increases, the relative change in dilute solution and ML-4 viscosity increases. At 200°F., this condition is apparent, but at 140° and 300°F. the amounts and rates of change in dilute solution and Mooney viscosity of the different masterbatches are almost equivalent.

In Figures 3 and 4 is shown the effect at the same temperatures of the time of heating on the dilute solution viscosities of masterbatches containing the commercial oils alone and blended with 20% of the alkylated bottoms.

At 140°F., replacement of 10 parts of either Circosol-2XH or of Dutrex 20 with 10 parts of alkylated bottoms at a 50 parts p.h.r. loading resulted in more breakdown, indicating that these bottoms are more reactive than the oils.

At 200°F., the alkylated bottoms with the Circosol-2XH not only increased the breakdown of the polymer but also increased the tendency of the polymer to condense or cross-link. This clearly shows the autoxidative behavior of Circosol-2XH supported by alkylated bottoms. With the Dutrex 20 at this temperature, the alkylated bottoms had little effect on the breakdown, but reduced the tendency of the polymer to condense.

At 300°F., the alkylated bottoms increased the initial rate of breakdown as measured by the DSV of the polymer in the masterbatch containing Dutrex 20, and after 2 hours of heating the polymer had a DSV which was similar to that of the polymer in the masterbatch containing Dutrex 20 alone. In the Circosol-2XH masterbatches, the alkylated bottoms increased the initial rate of polymer breakdown and also increased the tendency of the polymer to cross-link.

The Mooney viscosities (data not shown) of the treated masterbatch samples generally reflected similar relationships as the DSV values.

Of the three relatively pure hydrocarbons used, the greatest amount of polymer breakdown was obtained in the presence of dicyclopentadiene, whose activity, in spite of the variations in molecular structure ascribed to this chemical, is very likely attributable to active hydrogen attached to tertiary or secondary carbons in the molecule. The least breakdown occurred with the indene, but the differences between the breakdown with indene and with mesitylene were small. The behavior of the masterbatches made with the alkylated bottoms corresponds to results obtained with dicyclopentadiene.

As these results are contrary to those obtained earlier *(1)* where peroxides added to Circosol-2XH and used in masterbatching caused less polymer breakdown in air, but when added to Dutrex 20 caused more polymer breakdown, it seems likely that possible existing reactive hydrogens in the oils serve as oxygen carriers, but the presence of peroxides acts like pre-oxidation of the latex in inhibiting breakdown *(1)*.

SPECIAL NOTE

The work discussed herein was performed as a part of the research project sponsored by the Reconstruction Finance Corporation, Office of Synthetic Rubber, in connection with the Government Synthetic Rubber Program.

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Reproducing Machine Parts in Plastisol Flexible Molds

A FAST and economical method for reproducing intricate machine parts and potting electronic components with low-temperature-cure Bakelite C-8 epoxy resins uses flexible molds made of Bakelite vinyl resin-base plastisols. This new technique permits production runs of as much as 500 units at a cost of about $10 for molds compared to the high unit cost of metal molds for similar short production runs.

Houghton Laboratories, Inc., Olean, N. Y., developed the new flexible mold method, with its inherent simplicity and economy, largely through the combination of useful properties of epoxy and vinyl resins. The low temperature cure and low shrinkage of epoxy resins eliminate costly mold heating equipment. Gears, cams, bobbins and similar small machine parts cast from epoxy resins are light in weight yet have considerable shear strength and excellent dimensional stability. Severely undercut parts that would ordinarily call for costly split molds are easily cast from flexible molds of Bakelite vinyl resin-base plastisol.

Electronic and electrical components embedded in epoxy resins make use of the shock resistance of these resins as well as their high chemical and moisture resistance. The flexible mold method accommodates quickly and with minimum cost to the frequent changes made in the design of electronic components. Prototype, experimental and contract models can be produced at much lower cost by the flexible mold method than with other types of molds.

About 5 castings or potted assemblies, on the average, can be made from a single flexible mold. Simpler forms may have higher runs but a limit is set by the gradual extraction of plasticizer from the mold. For a casting of average size, about 100 flexible molds can be made with a gallon of Bakelite vinyl resin-base plastisol which costs approximately $10.

Any professional workshop or laboratory can be used to make these flexible molds in two simple steps. The first step consists of pouring fluid Bakelite vinyl resin-base plastisol around the object to be reproduced and curing it at 350°F. for 15 to 20 minutes depending on the mass of plastisol used. The container for the plastisol should allow about ¼-inch of space around the object to form the mold. After curing, the original mold pattern is simply popped out of the flexible mold leaving an accurate mold cavity. The second step is to fill this mold cavity with the cold-setting epoxy resin. Houghton Laboratories' Hysol 6020 is formulated with a Bakelite epoxy resin and hardener to set at room temperature. This formulation gels in one to three hours and hardens up to three hours later at room temperatures. The finished part is then easily popped out of the flexible mold which requires no mold release agent.

Due to their excellent electrical properties and noncorrosive nature, Bakelite epoxy resins are widely used for embedding or potting electrical components. The room temperature cure of this resin protects delicate electronic assemblies that could not withstand normal baking heat. Bakelite epoxy resins also make strong adhesive bond with metal, glass, plastics or ceramics and absorb jarring or shocks that might otherwise break fine connections.

Potting by the flexible mold process is done in the same two steps, but prior to the first step a master model of the completely potted assembly is made. This master model shapes the cavity in the flexible mold into which the electrical assembly is placed to be surrounded by epoxy resins. The use of Bakelite vinyl resin-base plastigels, a hand modeling plastic, facilitates the construction of master models. Since they may be shaped with the hands and baked hard in an ordinary oven, these plastigels simplify potting by the flexible mold method and make it capable of wide variation. Small assemblies or sub-assemblies, such as rectifiers, transformers, antenna masts, deflection yokes and resistors, are easily potted by this method.

Mold tolerances can be kept to within plus or minus .005 of an inch. However, the flexible mold process is not applicable to the casting of precision parts because stresses set up by the chemical reaction cause a certain amount of residual shrinkage in the plastisol mold. Bakelite epoxy resins, on the other hand, have a low shrinkage. Their low rate of contraction is useful for embedding electronic components such as transistors.

High Styrene Reinforcement of Hard Rubber

By HAROLD S. SELL and R. J. McCUTCHEON

Chemical Products Development Division, Goodyear Tire & Rubber Co., Akron, Ohio

HIGH styrene reinforcing resins are a class of materials which have come into commercial importance within the past ten years. They are primarily styrene-butadiene copolymers, and as a class of resins have polystyrene resin characteristics but much better compatibility with rubbers. They also possess lower softening points which facilitate incorporation into the rubber on conventional rubber processing equipment.

While the major use for high styrene resins has been as reinforcing agents in shoe soles, flooring, and allied products, some use has been made in rigid type applications. In these stocks the resin predominated and supplied the hardness and stiffness to the stock, while the rubber component acted as the plasticizer and improved the impact strength *(1, 2)*. These stocks produced excellent physical properties from a combination of rigidity, impact strength, and hardness, but their physical handling characteristics have greatly limited their use.

Major objections to these stocks have been the rigidness of the stocks in the "green" state and the necessity for high temperature equipment to handle the stocks. Since the processing characteristics resembled those of a plastic stock rather than a rubber stock, they were difficult for most rubber shops to handle. In addition, the danger of scorch in the accelerated stocks at the elevated milling temperatures was always a deterrent. From a plastics operation standpoint, the use of accelerated stocks and conventional rubber curing cycles did not fit into injection molding techniques. Consequently, these stocks found only limited application in the rigid application field in spite of their excellent properties.

In actual practice, a hard rubber type stock, which works readily on cool, conventional rubber equipment, but which cures to a hard rigid state, is the ideal handling stock for the rubber manufacturer. Even more ideal from the standpoint of the hard rubber manufacturer would be a stock which cures to the hard rigid state without developing the brittleness or low impact strength characteristic of the hard rubber or thermosetting resins. Recent developments in higher impact plastics make this even more necessary if hard rubber is to maintain its position in the rigid application field.

Some measure of increased impact strength can be achieved in conventional hard rubber stocks by the reduction of the sulfur loading. However, upon lowering sulfur content until sufficient impact strength is obtained, the hardness, stiffness, tensile strength, and softening point of the stocks have degraded past the useful point.

Note: This paper was presented before the Division of Rubber Chemistry, American Chemical Society, Los Angeles, Calif., March 18, 1953.

TABLE I—EXPERIMENTAL FORMULAS

	A	B	C
GR-S 1502	100.0	100.0	100.0
Pliolite S6	*	90.0	90.0
Filler Pigment		*	*
Benzothiazyl Disulfide (Altax)	1.5	1.5	1.5
Diphenyl Guanidine (DPG)	0.5	0.5	0.5
Sulfur	*	18.0	20.0

* As shown.

TABLE II—EFFECT OF REDUCED SULFUR IN A HARD RUBBER STOCK

GR-S 1502	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Altax	1.5	1.5	1.5	1.5	1.5	1.5	1.5
DPG	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Sulfur	28.0	26.0	24.0	22.0	20.0	18.0	16.0
	130.0	128.0	126.0	124.0	122.0	120.0	118.0
Specific Gravity (Actual)							
90/325°F.	1.131	1.135	1.129	1.119	1.105	1.090	1.069
Tensile (psi)							
60/325°F.	2842	2680	2250	1208	724	580	300
90	5300	4370	3680	2000	1400	790	355
120	5555	4730	4260	2445	2240	755	320
180	6975	6750	4170	3085	2250	955	315
240	6580	6770	5645	4320	1975	700	350
Elongation (%)							
60/325°F.	35	70	35	75	80	110	75
90	15	20	20	60	95	110	80
120	10	10	15	55	115	105	80
180	10	5	15	40	65	100	80
240	10	0	15	15	75	65	80
Shore D Hardness							
60/325°F.	77	72	74	58	40	34	26
90	83	80	76	70	55	44	26
120	84	81	82	73	60	50	29
180	85	83	80	75	66	56	32
240	85	84	82	78	69	58	35
Olsen Stiffness (90/325°F.—1×4×.075"—8 in/lb.—Load Scale Reading)							
10°	15.0	6.5	3.4	1.5			
20	28.0	13.5	5.3	2.6			
30	40.0	20.5	7.7	4.2			
40	50.0	27.0	9.1	4.7	too	too	too
50	58.0	32.4	10.1	5.2	soft	soft	soft
60	61.0	36.2	11.0	5.8			
70	60.0	38.9	11.5	5.8			
80	58.0	41.6	11.5	5.8			
90	58.0	43.2	11.5	5.3			
Olsen Stiffness (180/325°F.—1×4×.075"—8 in/lb.—Load Scale Reading)							
10°	17.0	16.4	14.1	8.2	1.3		
20	34.0	35.5	26.0	14.1	2.0		
30	50.0	54.7	37.0	19.3	2.5		
40	64.0	71.0	45.8	23.7	3.0	too	too
50	76.0	85.2	52.0	26.3	3.0	soft	soft
60	84.0	96.5	55.7	28.6	3.0		
70	87.0	——	53.0	27.1	3.0		
80	87.0	——	48.9	25.4	3.0		
90	87.0	——	——	——	3.0		
PHYSICAL DATA ON 5 x 8 x ½" BLOCKS							
Shore D Hardness							
90/325°F.	87	83	85	81	61	47	27
180	87	85	86	82	73	52	33
Unnotched Impact							
90/325°F.	.75	1.00	2.50	1.17	DNB	DNB	too
180	.25	.75	.54	——	10.3	DNB	soft
Notched Impact							
90/325°F.	.04	.21	.29	.58	.33	16.5	too
180	.13	.40	.25	——	.33	8.0	soft
Heat Distortion							
90/325°F.	136°F	112°F	112°F	too soft	too	too	too
180	140°F	128°F	121°F	108°F	soft	soft	soft

DNB = Did not break—in excess of 16.7 foot lbs/inch.

ASTM Test Procedures Used

Tensile Strength	D530 using D412 (Die B) strip
Shore D Hardness	D676
Olsen Stiffness	D747—8 inch-pound weight
Izod Impact Strength	D256 Method A
Heat Distortion Point	D648—66 psi fiber stress

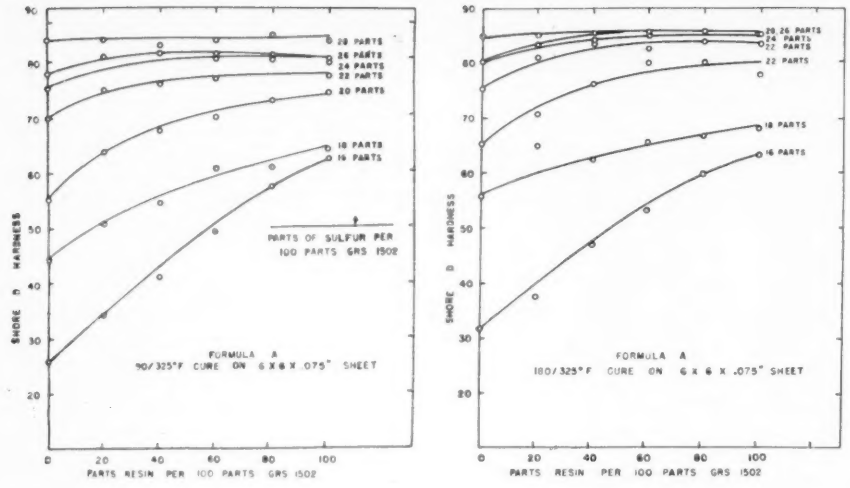

SHORE D HARDNESS
PARTS RESIN PER 100 PARTS GRS 1502
PARTS OF SULFUR PER 100 PARTS GRS 1502
FORMULA A
90/325°F CURE ON 6 X 6 X .075" SHEET
FORMULA A
180/325°F CURE ON 6 X 6 X .075" SHEET

FIG. 1—Effect of resin reinforcement on hardness.

This is illustrated in the range of stocks shown in Table II.

Since reinforcing resins develop considerable hardness in a soft rubber stock, and can be worked on unheated rubber equipment in amounts up to 100 parts of high styrene resin per 100 parts of rubber hydrocarbon, it seemed likely that the incorporation of these resins into the lower sulfur hard rubber stocks might supply the necessary hardness and stiffness to again place them into a useful range. With these possibilities in view, the following investigation of high styrene resin in hard rubber stocks was undertaken.

Scope and Preparation

The scope of the investigation covered GR-S and high styrene resin blends from 100 parts of GR-S without resin to 100 parts of GR-S with 100 parts of high styrene resin, the latter resin loading being the upper practical limit of workability on unheated rubber equipment. Acceleration in the study was kept constant and sulfur ratios were varied from 16 parts of sulfur to 100 parts of rubber hydrocarbon upwards to conventional hard rubber sulfur levels. The three formulations—Formulas A, B, and C—used throughout the study are shown in Table I.

Of the many commercial resins available, Pliolite S6 was chosen as a typical resin for these studies. Physical characteristics of the resin are as follows:

Composition	Styrene/Butadiene
Softening Point ...	150°F.
Specific Gravity ...	1.05
Water Absorption..	.55 mg/sq cm
Olsen Flow	180 seconds/in @ 212°F. and 1500 psi
	47 seconds/in @ 240°F. and 1500 psi
	11 seconds/in @ 270°F. and 1500 psi
Electrical Properties	Excellent

In preparation of the test stocks, the rubber and resin were premasterbatched and the acceleration added on a cool mill. Samples were cured into 6 x 6 x .075-inch test sheets, and 5 x 8 x ½-inch test blocks. Only one curing temperature, 325°F., was investigated in this study. A wide range of cure times was investigated.

A complete tabulation of the physical characteristics of these stocks appears in Table III. Tests were run in accordance with the ASTM standards shown in Table II. The significance of these results is discussed below.

Test Results and Their Significance

Hardness: Examination of the hardness values plotted in Figures 1 and 2 shows that the hardness (Shore D)

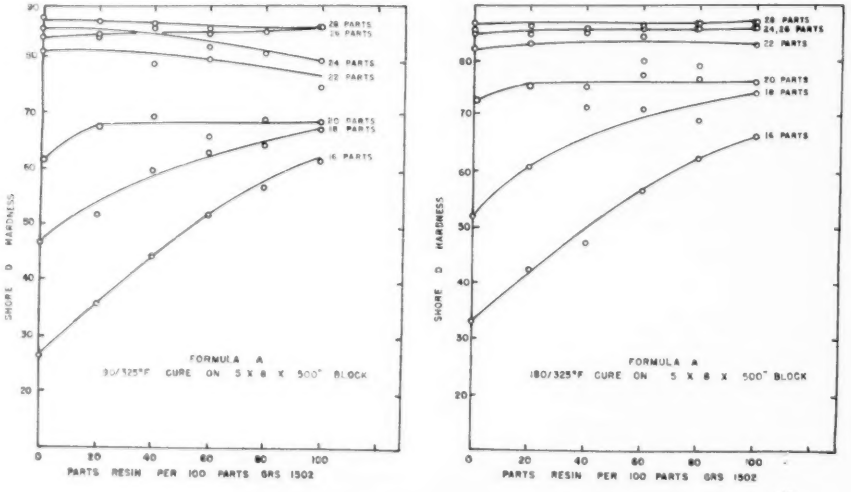

SHORE D HARDNESS
PARTS RESIN PER 100 PARTS GRS 1502
FORMULA A
90/325°F CURE ON 5 X 8 X .500" BLOCK
FORMULA A
180/325°F CURE ON 5 X 8 X .500" BLOCK

FIG. 2—Effect of resin reinforcement on hardness.

Table III—Effect of Pliolite S6 in Hard Rubber Stocks

16 PART SULFUR LEVEL

GR-S 1502	100.0	100.0	100.0	100.0	100.0	100.0
Pliolite S6	—	20.0	40.0	60.0	80.0	100.0
Altax	1.5	1.5	1.5	1.5	1.5	1.5
DPG	0.5	0.5	0.5	0.5	0.5	0.5
Sulfur	16.0	16.0	16.0	16.0	16.0	16.0
	118.0	138.0	158.0	178.0	198.0	218.0
Specific Gravity (Actual)						
90/325°F.	1.069	1.064	1.067	1.063	1.060	1.056
Tensile (psi)						
60/325°F.	300	905	1660	2325	2565	2690
90	355	855	1750	2435	2445	2660
120	320	1090	1730	2595	2480	2620
180	315	1260	1955	2455	2765	2705
240	350	1350	1855	2360	2680	2620
Elongation (%)						
60/325°F.	75	80	100	110	130	120
90	80	90	110	120	120	115
120	80	110	100	130	100	90
180	80	110	100	100	120	100
240	80	110	100	90	110	85
Shore D Hardness						
60/325°F.	26	30	41	45	55	58
90	26	33	41	49	57	62
120	29	34	44	51	57	62
180	32	38	48	53	60	63
240	35	38	48	54	60	63
Olsen Stiffness (90/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)						
10°				0.6	1.2	2.1
20				1.2	3.8	5.7
30	too	too	too	1.8	4.7	8.3
40	soft	soft	soft	2.4	5.9	9.7
50				3.1	7.1	11.7
60				3.1	7.1	12.5
70				3.1	7.7	13.2
80				3.7	7.7	13.9
90				3.7	7.7	13.9
Olsen Stiffness (180/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)						
10°				0.6	1.2	1.8
20				1.1	3.7	4.9
30	too	too	too	2.3	5.5	7.4
40	soft	soft	soft	2.8	7.4	9.2
50				3.4	8.0	10.4
60				3.4	8.6	11.6
70				3.4	9.2	12.3
80				3.4	8.6	12.3
90				3.4	8.6	12.3
PHYSICAL DATA ON 5 x 8 x ½" BLOCKS						
Shore D Hardness						
90/325°F.	27	36	44	52	57	62
180	33	42	47	57	62	66
Unnotched Impact						
90/325°F.	too	too	too	too soft	DNB	DNB
180	soft	soft	soft	DNB	DNB	DNB
Notched Impact						
90/325°F.	too	too	too	too soft	12.8	12.2
180	soft	soft	soft	11.8	12.4	12.1
Heat Distortion—66 psi						
90/325°F.	too	too	too	148°F.	150°F.	153°F.
180	soft	soft	soft	152°F.	152°F.	155°F.

18 PART SULFUR LEVEL

GR-S 1502	100.0	100.0	100.0	100.0	100.0	100.0
Pliolite S6	—	20.0	40.0	60.0	80.0	100.0
Altax	1.5	1.5	1.5	1.5	1.5	1.5
DPG	0.5	0.5	0.5	0.5	0.5	0.5
Sulfur	18.0	18.0	18.0	18.0	18.0	18.0
	120.0	140.0	160.0	180.0	200.0	220.0
Specific Gravity (Actual)						
90/325°F.	1.090	1.082	1.072	1.072	1.069	1.067
Tensile (psi)						
60/325°F.	580	1460	1585	2610	2775	2985
90	790	1940	2030	2300	2805	3140
120	755	1480	2115	2539	3240	2735
180	955	2280	2630	3040	3360	3375
240	700	2220	2682	3340	3560	3240
Elongation (%)						
60/325°F.	110	110	85	120	100	120
90	110	110	100	85	80	90
120	105	75	80	90	105	75
180	100	95	105	110	105	100
240	65	85	90	110	110	80
Shore D Hardness						
60/325°F.	34	43	47	51	58	61
90	44	51	54	61	61	63
120	50	53	51	61	67	65
180	56	66	62	66	68	68
240	58	68	71	68	69	68
Olsen Stiffness (90/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)						
10°			0.0	0.6	2.4	4.3
20			0.7	1.2	5.4	9.2
30	too	too	0.7	2.5	7.6	13.5
40	soft	soft	0.7	2.5	9.1	16.4
50			1.4	3.1	9.9	18.2
60			1.4	3.7	10.6	18.6
70			1.4	3.1	10.9	18.4
80			1.4	2.5	10.9	18.4
90			—	—	10.7	18.1

18 PART SULFUR LEVEL—CONT'D

Olsen Stiffness (180/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)						
10°		0.5	0.6	0.6	2.3	4.5
20		0.8	0.6	1.2	5.1	8.3
30	too	1.0	1.2	2.5	6.7	11.5
40	soft	1.0	1.2	3.1	8.3	14.1
50		1.1	1.2	3.7	9.3	16.0
60		1.1	1.8	4.3	10.2	17.1
70		1.2	2.4	5.0	10.6	17.3
80		1.2	2.4	5.0	10.6	16.6
90		1.2	2.4	5.0	10.6	16.6
PHYSICAL DATA ON 5 x 8 x ½" BLOCKS						
Shore D Hardness						
90/325°F.	47	52	60	63	64	67
180	52	61	71	71	69	74
Unnotched Impact						
90/325°F.	DNB	DNB	DNB	DNB	DNB	DNB
180	DNB	DNB	DNB	DNB	DNB	DNB
Notched Impact						
90/325°F.	16.5	15.9	15.3	14.8	13.9	11.0
180	8.6	8.7	13.2	10.7	8.9	8.9
Heat Distortion—66 psi						
90/325°F.	too	too	too	too	152°	152°
180	soft	soft	soft	soft	155°	156°

20 PART SULFUR LEVEL

GR-S 1502	100.0	100.0	100.0	100.0	100.0	100.0
Pliolite S6	—	20.0	40.0	60.0	80.0	100.0
Altax	1.5	1.5	1.5	1.5	1.5	1.5
DPG	0.5	0.5	0.5	0.5	0.5	0.5
Sulfur	20.0	20.0	20.0	20.0	20.0	20.0
	122.0	142.0	162.0	182.0	202.0	222.0
Specific Gravity (Actual)						
90/325°F.	1.105	1.096	1.089	1.083	1.078	1.074
Tensile (psi)						
60/325°F.	724	2000	3270	3310	3215	3070
90	1400	2560	3560	3650	3680	3690
120	2240	2425	3825	3885	3980	3735
180	2250	3140	3640	4060	4165	3875
240	1975	2555	3680	3900	3925	4080
Elongation (%)						
60/325°F.	80	85	120	110	115	95
90	95	95	110	120	115	120
120	115	90	115	90	120	105
180	65	95	90	80	110	95
240	75	65	65	85	80	90
Shore D Hardness						
60/325°F.	40	54	66	69	66	68
90	55	64	67	70	73	74
120	60	66	75	77	78	76
180	66	71	76	80	80	78
240	69	71	78	80	80	79
Olsen Stiffness (90/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)						
10°		0.4	0.9	1.2	2.8	4.0
20	too	0.6	1.6	2.5	6.3	7.9
30	soft	0.9	2.5	3.5	8.3	11.4
40		1.2	3.0	4.1	9.6	14.1
50		1.5	3.3	4.4	10.5	15.8
60		1.6	3.5	4.7	11.4	16.9
70		1.6	3.5	4.7	11.1	18.1
80		1.6	3.5	4.7	10.6	19.2
90		1.6	3.5	4.7	9.7	19.7
Olsen Stiffness (180/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)						
10°	1.3	0.9	1.0	4.1	3.6	4.3
20	2.0	1.3	2.0	7.6	6.8	8.7
30	2.5	1.3	3.0	10.5	9.0	10.8
40	3.0	1.6	3.6	12.8	11.3	14.6
50	3.0	1.9	4.0	14.4	13.2	17.3
60	3.0	2.0	4.3	15.2	14.1	18.6
70	3.0	2.0	4.3	15.2	14.7	19.7
80	3.0	2.0	4.3	15.2	15.1	20.2
90	3.0	2.0	4.3	14.2	14.7	20.2
PHYSICAL DATA ON 5 x 8 x ½" BLOCKS						
Shore D Hardness						
90/325°F.	61	68	69	65	68	68
180	73	76	75	78	77	76
Unnotched Impact						
90/325°F.	DNB	DNB	DNB	DNB	DNB	DNB
180	10.3	DNB	DNB	DNB	DNB	DNB
Notched Impact						
90/325°F.	.33	5.9	8.8	13.2	10.8	12.9
180	.33	.54	3.0	4.33	4.8	1.5
Heat Distortion—66 psi						
90/325°F.	too	too	too	too	150°F.	158°F.
180	soft	soft	soft	soft	148°F.	152°F.

TABLE III—CONTINUED

22 PART SULFUR LEVEL

GR-S 1502	100.0	100.0	100.0	100.0	100.0	100.0
Pliolite S6	—	20.0	40.0	60.0	80.0	100.0
Altax	1.5	1.5	1.5	1.5	1.5	1.5
DPG	0.5	0.5	0.5	0.5	0.5	0.5
Sulfur	22.0	22.0	22.0	22.0	22.0	22.0
	124.0	144.0	164.0	184.0	204.0	224.0
Specific Gravity (Actual)						
90/325°F.	1.119	1.116	1.093	1.095	1.091	1.078
Tensile (psi)						
60/325°F.	1208	3110	3115	3290	3660	3560
90	2000	3190	3940	3970	4220	3890
120	2445	3135	3620	3720	4340	4220
180	3085	3635	4320	3695	4270	4280
240	4320	4880	5100	4230	5080	4650
Elongation (%)						
60/325°F.	75	75	105	100	110	120
90	60	100	110	105	100	105
120	55	25	85	90	100	105
180	40	60	55	85	50	100
240	15	10	35	55	25	60
Shore D Hardness						
60/325°F.	58	75	71	67	68	75
90	70	73	76	77	78	77
120	73	80	82	81	83	79
180	75	80	84	82	83	84
240	78	83	86	84	85	84
Olsen Stiffness (90/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)						
10°	1.5	2.3	1.6	4.5	4.9	5.0
20	2.6	4.6	3.4	8.3	9.7	9.5
30	4.2	5.7	4.9	11.9	13.5	13.5
40	4.7	6.9	6.2	14.7	16.2	16.5
50	5.2	8.0	7.2	16.6	18.9	19.0
60	5.8	8.6	7.6	18.5	20.0	19.5
70	5.8	8.6	8.0	19.2	20.7	20.0
80	5.8	8.0	8.0	19.5	21.1	19.5
90	5.3	7.4	8.0	19.2	21.1	18.0
Olsen Stiffness (180/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)						
10°	8.2	10.2	—	—	11.0	7.0
20	14.1	18.2	—	—	21.0	14.0
30	19.3	25.1	—	—	30.0	20.0
40	23.7	31.2	—	—	38.0	25.0
50	26.3	35.0	—	—	44.0	31.0
60	28.6	37.2	—	—	49.0	32.0
70	27.1	37.7	—	—	52.0	33.5
80	25.4	36.7	—	—	53.0	34.5
90	—	33.1	—	—	52.0	34.5
PHYSICAL DATA ON 5 x 8 x ½" BLOCKS						
Shore D Hardness						
90/325°F.	81	84	79	80	82	75
180	82	83	77	80	79	83
Unnotched Impact						
90/325°F.	1.17	7.8	DNB	DNB	15.2	DNB
180	—	2.5	2.6	DNB	7.0	DNB
Notched Impact						
90/325°F.	.58	.83	.67	.71	.58	1.80
180	—	.54	.50	.54	.54	.71
Heat Distortion—66 psi						
90/325°F.	too soft	127°F.	106°F.	115°F.	148°F.	150°F.
180	108°F.	131°F.	104°F.	125°F.	150°F.	152°F.

24 PART SULFUR LEVEL

GR-S 1502	100.0	100.0	100.0	100.0	100.0	100.0
Pliolite S6	—	20.0	40.0	60.0	80.0	100.0
Altax	1.5	1.5	1.5	1.5	1.5	1.5
DPG	0.5	0.5	0.5	0.5	0.5	0.5
Sulfur	24.0	24.0	24.0	24.0	24.0	24.0
	126.0	146.0	166.0	186.0	206.0	226.0
Specific Gravity (Actual)						
90/325°F.	1.129	1.122	1.113	1.095	1.090	1.089
Tensile (psi)						
60/325°F.	2250	3478	3480	4080	4030	3568
90	3680	4740	4950	4425	4280	4200
120	4260	6055	5100	4435	4310	4350
180	4170	—	5100	5600	5250	6180
240	5645	6460	6200	6220	6340	5630
Elongation (%)						
60/325°F.	35	60	80	120	115	90
90	20	20	15	105	110	90
120	15	15	25	95	95	85
180	15	—	15	15	25	10
240	15	10	10	20	10	10
Shore D Hardness						
60/325°F.	74	76	77	76	76	75
90	76	83	83	80	81	80
120	82	85	84	83	82	82
180	80	86	83	85	83	85
240	82	85	84	85	85	86
Olsen Stiffness (90/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)						
10°	3.4	4.3	7.1	8.0	7.8	9.0
20	5.3	9.2	13.6	14.5	14.6	16.6
30	7.7	13.5	18.5	19.7	20.2	23.4
40	9.1	16.4	22.9	23.8	25.4	30.3
50	10.1	18.2	26.1	26.5	28.9	34.1
60	11.0	18.6	28.3	29.0	31.0	38.2
70	11.5	18.4	29.4	29.0	31.8	40.0
80	11.5	18.4	29.4	28.1	31.0	41.4
90	11.5	18.1	28.8	25.2	29.7	40.9

24 PART SULFUR LEVEL—CONT'D

Olsen Stiffness (180/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)						
10°	14.1	12.3	15.1	17.0	12.9	12.1
20	26.0	25.1	29.2	33.5	25.3	39.8
30	37.0	36.2	40.6	48.5	36.3	56.6
40	45.8	46.8	52.5	60.5	45.5	70.5
50	52.0	53.8	59.3	69.5	53.0	80.0
60	55.7	59.6	64.0	74.5	57.8	86.5
70	53.0	63.7	65.0	76.0	61.0	88.0
80	48.9	64.4	63.5	73.0	61.0	—
90	—	64.4	58.2	—	59.0	—
PHYSICAL DATA ON 5 x 8 x ½" BLOCKS						
Shore D Hardness						
90/325°F.	85	86	86	82	81	80
180	86	84	86	86	86	86
Unnotched Impact						
90/325°F.	2.50	5.20	10.60	12.3	DNB	DNB
180	.54	.87	2.80	7.2	6.1	5.0
Notched Impact						
90/325°F.	.29	.75	.33	.91	1.04	.50
180	.25	.46	.83	.46	.96	.67
Heat Distortion—66 psi						
90/325°F.	112°F.	146°F.	137°F.	116°F.	144°F.	156°F.
180	121°F.	146°F.	132°F.	130°F.	146°F.	153°F.

26 PART SULFUR LEVEL

GR-S 1502	100.0	100.0	100.0	100.0	100.0	100.0
Pliolite S6	—	20.0	40.0	60.0	80.0	100.0
Altax	1.5	1.5	1.5	1.5	1.5	1.5
DPG	0.5	0.5	0.5	0.5	0.5	0.5
Sulfur	26.0	26.0	26.0	26.0	26.0	26.0
	128.0	148.0	168.0	188.0	208.0	228.0
Specific Gravity (Actual)						
90/325°F.	1.135	1.124	1.111	1.106	1.103	1.096
Tensile (psi)						
60/325°F.	2680	3795	4200	4500	3980	4320
90	4320	5765	5060	5230	4520	4880
120	4730	5330	5750	6060	5800	6190
180	6750	7330	6900	7100	6800	7050
240	6770	7550	7280	7440	7560	7660
Elongation (%)						
60/325°F.	70	85	100	110	105	115
90	20	50	45	40	80	100
120	10	15	15	10	20	20
180	5	0	0	10	10	10
240	0	0	0	5	0	0
Shore D Hardness						
60/325°F.	72	77	80	78	78	77
90	80	82	82	83	81	83
120	81	82	82	83	83	83
180	83	85	84	85	83	83
240	84	85	84	85	84	84
Olsen Stiffness (90/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)						
10°	6.5	12.9	12.5	12.9	12.3	13.5
20	13.5	28.0	27.0	27.0	25.1	27.0
30	20.5	41.5	39.5	41.0	36.2	39.4
40	27.0	53.8	50.5	52.3	46.8	50.4
50	32.4	63.8	59.2	61.5	53.8	59.0
60	36.2	70.8	64.5	68.5	59.6	64.5
70	38.9	75.5	67.5	73.3	63.7	67.6
80	41.6	79.0	68.0	75.5	64.4	68.3
90	43.2	79.5	67.5	76.0	64.4	67.0
Olsen Stiffness (180/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)						
10°	16.4	16.0	19.2	17.2	17.3	18.6
20	35.5	36.0	41.5	37.5	37.1	39.0
30	54.7	56.0	63.2	57.8	55.7	58.5
40	71.0	74.0	81.2	75.0	71.7	75.3
50	85.2	88.0	97.0	89.0	85.6	89.7
60	96.5	97.5	—	99.2	96.0	—
70	—	—	—	—	—	—
80	—	—	—	—	—	—
90	broke	—	—	—	—	—
PHYSICAL DATA ON 5 x 8 x ½" BLOCKS						
Shore D Hardness						
90/325°F.	83	84	84	83	84	84
180	85	85	86	85	86	86
Unnotched Impact						
90/325°F.	1.00	2.70	7.5	6.1	8.3	9.2
180	.75	2.30	7.9	7.0	5.8	5.4
Notched Impact						
90/325°F.	.21	.84	.50	.54	.42	.42
180	.42	.29	.50	.46	.37	.40
Heat Distortion—66 psi						
90/325°F.	112°F.	140°F.	140°F.	131°F.	129°F.	140°F.
180	128°F.	149°F.	147°F.	142°F.	144°F.	157°F.

TABLE III—CONTINUED

28 PART SULFUR LEVEL

GR-S 1502	100.0	100.0	100.0	100.0	100.0	100.0
Pliolite S6	——	20.0	40.0	60.0	80.0	100.0
Altax	1.5	1.5	1.5	1.5	1.5	1.5
DPG	0.5	0.5	0.5	0.5	0.5	0.5
Sulfur	28.0	28.0	28.0	28.0	28.0	28.0
	130.0	150.0	170.0	190.0	210.0	230.0
Specific Gravity (Actual)						
90/325°F.	1.131	1.135	1.119	1.109	1.109	1.100
Tensile (psi)						
60/325°F.	2842	3570	3500	4345	4270	4080
90	5300	5675	4380	6020	5680	5200
120	5555	5405	4810	5110	6265	5890
180	6975	7110	6525	7120	7960	7600
240	6589	6550	7350	6545	6560	6955
Elongation (%)						
60/325°F.	25	65	100	130	100	115
90	15	15	90	5	20	45
120	10	10	30	35	20	35
180	10	10	10	15	5	5
240	10	10	10	15	10	10
Shore D Hardness						
60/325°F.	77	75	71	75	79	76
90	83	83	81	83	84	84
120	84	85	83	85	85	84
180	85	86	84	86	86	86
240	85	86	85	87	85	85
Olsen Stiffness (90/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)						
10°	13.0	13.0	12.5	16.5	14.3	13.0
20	28.0	25.0	23.0	32.0	29.1	25.4
30	40.0	38.0	32.0	47.0	43.3	37.0
40	50.0	48.0	40.0	59.5	55.9	47.2
50	58.0	51.0	45.5	69.5	66.0	54.8
60	61.0	64.0	48.0	76.5	73.0	60.5
70	60.0	69.0	48.5	80.0	77.0	63.6
80	58.0	69.0	47.0	80.5	68.0	64.2
90	58.0	69.0	42.0	78.0	76.3	60.3
Olsen Stiffness (180/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)						
10°	17.0	16.0	15.8	17.6	17.3	16.9
20	34.0	32.0	30.8	36.6	34.6	32.2
30	50.0	49.0	44.2	55.5	53.0	48.5
40	64.0	62.0	56.8	69.0	69.5	61.5
50	76.0	——	67.0	——	83.4	73.0
60	84.0	——	75.4	——	93.6	82.5
70	87.0	——	80.0	——	——	87.5
80	87.0	——	82.8	——	——	——
90	84.0	——	83.0	——	——	——
PHYSICAL DATA ON 5 x 8 x ½" BLOCKS						
Shore D Hardness						
90/325°F.	87	85	85	85	85	86
180	87	86	85	86	87	87
Unnotched Impact						
90/325°F.	.75	1.46	5.33	8.20	5.17	5.92
180	.25	1.33	4.05	6.00	5.54	5.79
Notched Impact						
90/325°F.	.04	.29	.54	.38	.37	.42
180	.13	.29	.38	.62	.62	.50
Heat Distortion—66 psi						
90/325°F.	136°F.	136°F.	147°F.	145°F.	143°F.	148°F.
180	140°F.	139°F.	145°F.	145°F.	153°F.	160°F.

DNB = Did not break—in excess of 16.7 foot lbs./inch.

is materially increased by the incorporation of the reinforcing resin into the hard rubber stock. Both the 90 and 180/325°F. cures, whether in .075-inch gauge sheets or in heavier gauge, ½-inch blocks, show the same characteristics. Major differences are that the 180/325°F. cures start at initially higher hardness levels.

The increase in hardness due to the resin addition is much more pronounced in the lower sulfur levels. After reaching the 28 part sulfur level, the hardness is unchanged by the resin addition. This is probably explained by the fact that the resin hardness of 83 Shore D is equal to the hardness developed by a non-reinforced resin stock at 28 part sulfur level, and it is unlikely that resin addition would alter the hardness of this stock.

Impact Strength: Generally lower impact strength is associated with higher hardness stocks, but such is not the case with the resin-reinforced hard rubber stocks. Unnotched impact values plotted versus resin reinforcement in Figure 3 show increased impact strength at all sulfur levels through the addition of resin. The role of the resin appears to be two-fold in this respect: first, to convert soft, low sulfur stocks into a useful impact range, and second, to maintain a higher level of impact strength as the sulfur level is increased. It is safe to conclude from the data that the addition of resin has added stability to the unnotched impact property by allowing greater latitude in sulfur levels than available in unreinforced stocks.

As might be expected, the notched impact values are lower than the unnotched values, but nevertheless again reflect the greater strength of the reinforced stocks. Plots of the notched impact values are shown in Figure 4. The notched Izod impact strengths show a much more "peaky" type curve than the unnotched impact curves. In this case, the strength appears to go through a maximum at some point in the resin loading, and this maxima appears to be shifted toward higher resin loadings as the sulfur content is increased. In the case of the 22 part sulfur stock, the maxima appears to be in excess of the 100 parts of resin used.

In the case of unnotched impact strength, and more particularly in the case of the notched impact strength, the state of cure of the sample has considerable effect upon its impact strength. Thus, it appears more desirable to obtain hardness by additional resin rather than longer cures.

The impact strength data suggest that in compound-

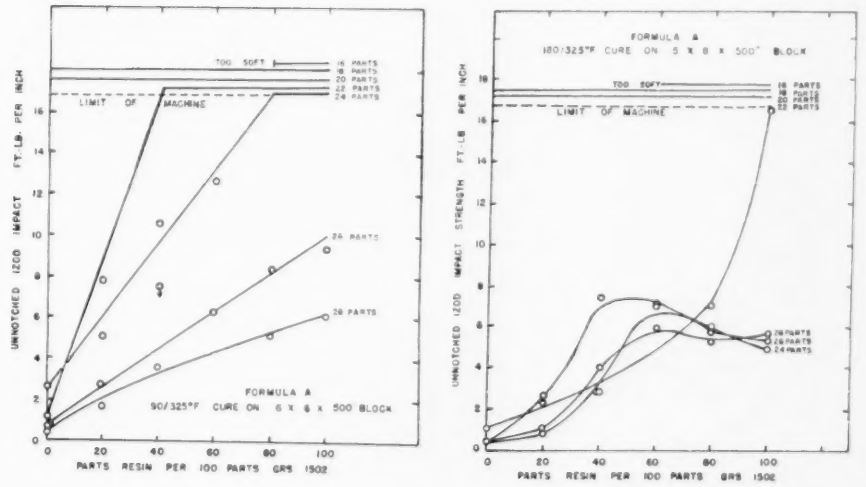


FIG. 3—Effect of resin reinforcement on impact strength.

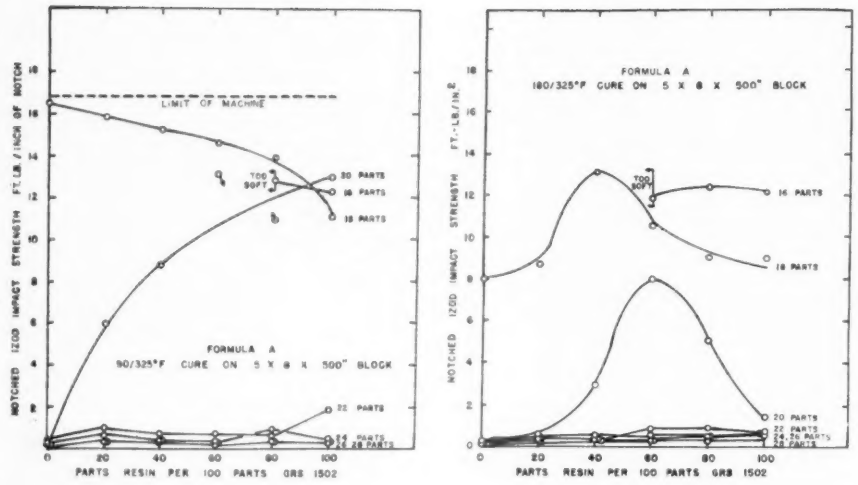


FIG. 4—Effect of resin reinforcement on impact strength.

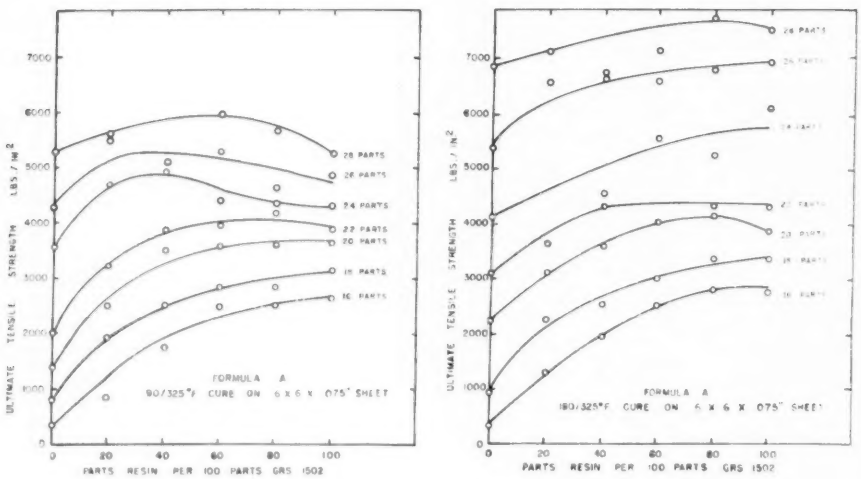
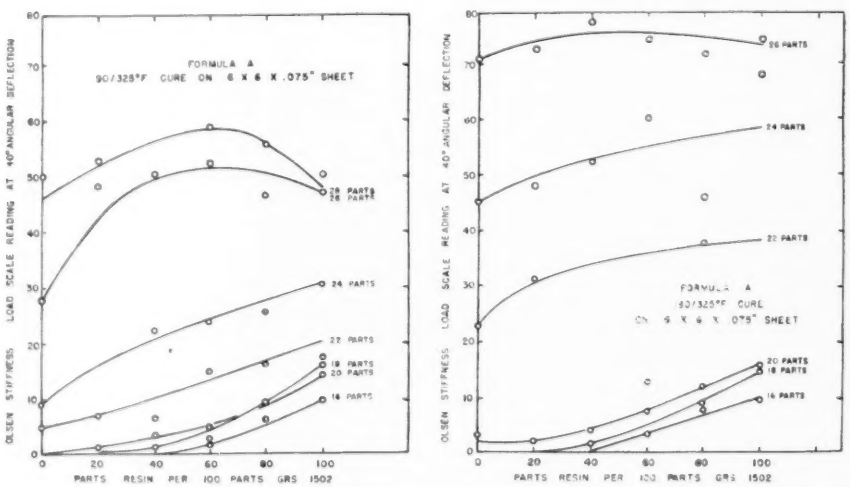


FIG. 5—Effect of resin reinforcement on tensile strength.

FIG. 6—Effect of resin reinforcement on stiffness.



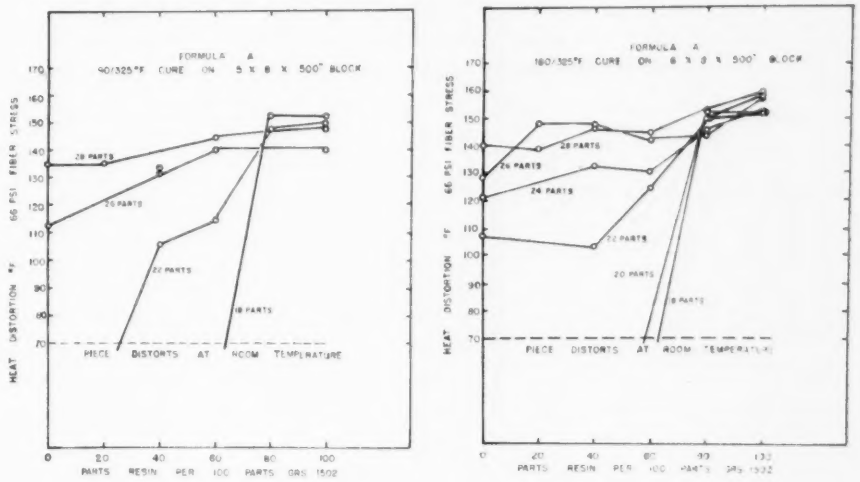

FORMULA A
90/325°F CURE ON 5 X 8 X 500" BLOCK
HEAT DISTORTION °F 66 PSI FIBER STRESS
28 PARTS
26 PARTS
22 PARTS
18 PARTS
PIECE DISTORTS AT ROOM TEMPERATURE
0 20 40 60 80 100
PARTS RESIN PER 100 PARTS GRS 1502
FORMULA A
180/325°F CURE ON 8 X 8 X 500" BLOCK
HEAT DISTORTION °F 66 PSI FIBER STRESS
28 PARTS
26 PARTS
24 PARTS
22 PARTS
20 PARTS
18 PARTS
PIECE DISTORTS AT ROOM TEMPERATURE
PARTS RESIN PER 100 PARTS GRS 1502

FIG. 7—Effect of resin reinforcement on heat distortion.

ing it may be desirable to reinforce a lower sulfur level hard rubber stock with a high styrene reinforcing resin and thereby obtain equal hardness to the conventional hard rubber stock, but at the same time achieve a considerable improvement in impact strength.

Ultimate Tensile Strength: As might be anticipated from the hardness and impact strength data, the ultimate tensile strength of the resin-reinforced stock is also increased by resin addition (Figure 5). Largest percentage increases were experienced in the lower sulfur stocks. Unlike the hardness values which appeared to reach an ultimate, the tensile strength for the most part showed progressively greater strength with resin addition with little suggestion of convergence to a common point at some higher resin level than used in the study.

Stiffness: Stiffness, as measured by the Olsen Stiffness Tester, showed increased rigidity on both the 90 and 180/325°F. cures upon resin addition. This is illustrated graphically in Figure 6. It will be noted that stocks which are too soft to measure on the Olsen Stiffness tester at 16, 18, and 20 parts sulfur level in conventional hard rubber stocks are converted to considerably more rigid and usable stocks by the resin addition. Even the higher sulfur content stocks, 26 and 28 parts, are stiffened to some extent by the resin addition.

Heat Distortion: The heat distortion of any hard rubber product is of great importance in defining its application limitations. Since a high styrene resin of 150°F. softening point was used in these evaluations, it was not expected that the softening point of the compound would be much in excess of this figure. This is shown to be true on the plots in Figure 7. The plots do show that at any given sulfur level, the addition of resin does help the stock reach a rigid condition sooner. It is interesting to note that the sulfur levels used in this study were not sufficiently high to achieve the heat distortion point of the resin without some resin reinforcement.

Although not evaluated in this study, it does seem possible that a higher heat distortion reinforcing resin might improve this particular property.

Other Physical Improvements: Of equal importance to the improvements discussed above were the improvements in processing and physical condition observed in the stocks with resin reinforcement. In many cases these improvements would merit the addition of resin even if no improvements in physical properties resulted. These improvements are discussed in length below.

The processing characteristics of any stock is of equal importance to its physical characteristics. Unloaded GR-S stocks, whether they be low or high sulfur stocks, are generally soft and "nervy" and difficult to form into a good preform by conventional calendering or extrusion

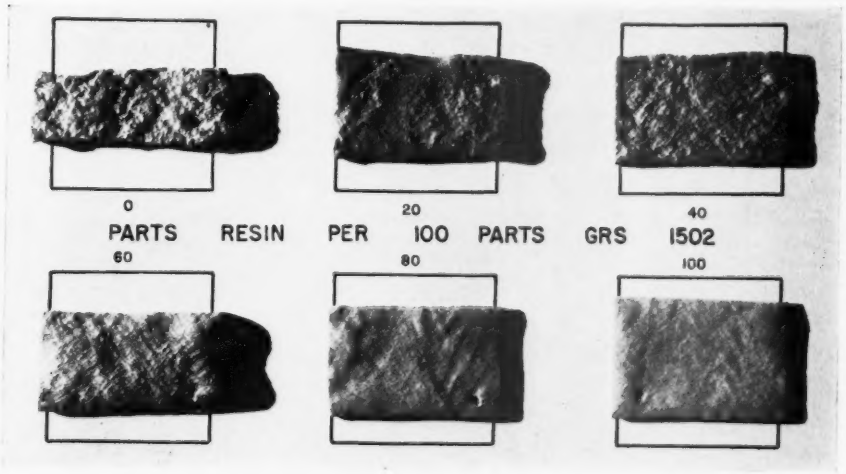


FIG. 8—Effect of resin reinforcement on "green" stock processing—Formula A. (Blocks show original size of piece cut from the mill).

TABLE IV—HEAT GENERATION IN CURING RESIN-REINFORCED HARD RUBBER STOCKS

Curing Temperature — 325°F.
Block Size — 5 x 8 x ½"
Formula A

Parts Resin	0	20	40	60	80	100
Cure Time (Mins.)	Measured Temperature in Center of Block (°F.)					
2	240	185	——	——	——	209
3	——	——	——	——	201	——
4	——	240	——	——	——	255
5	260	258	246	245	247	——
6	——	279	——	——	——	284
7	——	291	——	——	279	——
8	303	——	——	——	——	307
9	315	312	——	289	303	——
10	326	——	——	307	——	——
11	342	334	321	322	321	——
12	362	348	——	333	329	330
13	400	360	——	343	337	332
14	620	376	343	——	343	336
15	560	416	350	367	350	——
16	510	566	360	399	359	340
17	460	488	——	457	368	——
18	427	450	388	467	379	342
19	400	420	——	431	391	——
20	378	377	453	429	396	345
21	366	353	470	402	391	——
22	354	346	461	391	385	345
23	346	330	437	377	377	——
24	341	326	——	——	367	345
25	337	325	405	359	361	——
26	327	——	——	——	356	——
27	326	——	——	——	——	——
28	325	——	368	——	345	——
29	——	——	——	——	——	——
30	——	——	354	335	335	342
31	Max.	Max.	——	——	——	——
32	Temp.	Temp.	——	——	——	338
33	640°	566°	——	——	——	——
34	@13½'	@16'	——	——	——	——
35			335	327	325	335
36			——	——	——	——
37			——	——	——	——
38			——	——	——	——
39			——	——	——	——
40			325	325	——	330

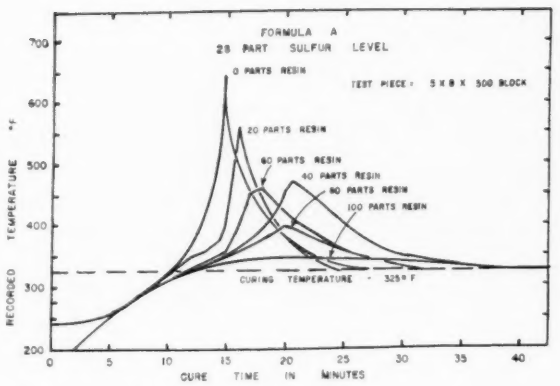


FIG. 9—Effect of resin incorporation on exothermic curing reaction.

methods. The addition of reinforcing resins to the hard rubber compound has the same effect as in conventional rubber stocks, i.e., killing the nerve, stiffening the stock, and making possible a more easily handled and better preforming stock. Thus, resin reinforcement has much the same effect on processibility as loading the compound with reinforcing or semi-reinforcing pigments. Nerve reduction and surface improvement can best be demonstrated by the illustrations shown in Figure 8. Samples cut from the mill at .050-inch gauge and allowed to cool and shrink freely, using the series of stocks at 26 part sulfur level, ably demonstrate the improvement in surface and "nerve" reduction due to the resin.

Another processing characteristic which plagues the

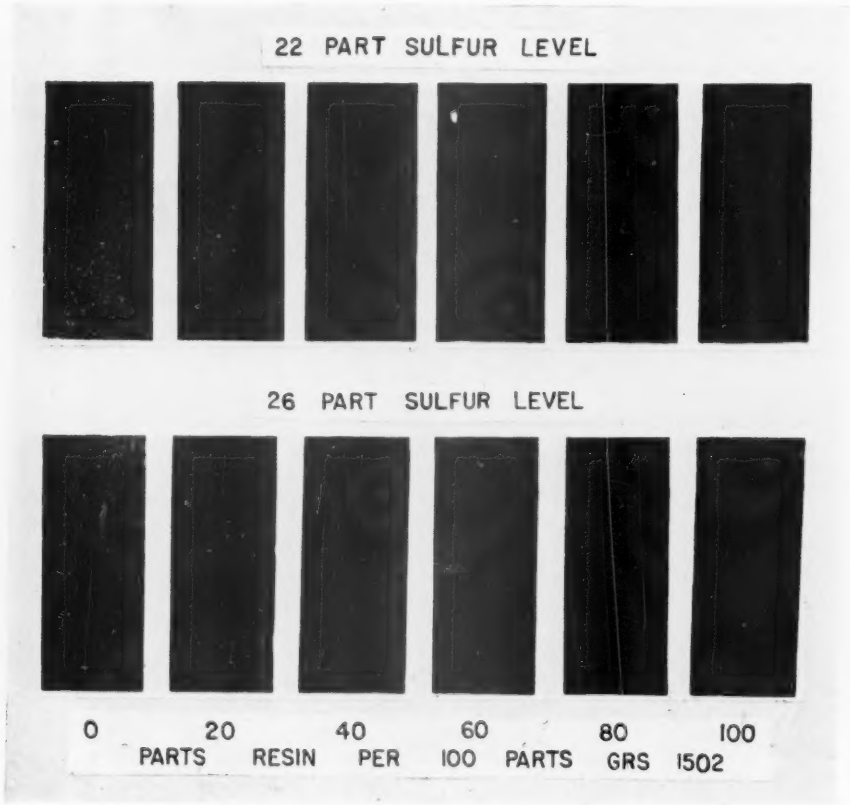


FIG. 10—Effect of reinforcing resin on surface appearance — Formula A. (Cure: 90/325°F. on 6 x 6 x .075" sheet).

TABLE V—EFFECT OF HARD CLAY LOADING IN A RESIN REINFORCED HARD RUBBER STOCK

18 PART SULFUR LEVEL

GR-S 1502	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Pliolite S6	90.0	90.0	90.0	90.0	90.0	90.0	90.0
Hard Clay	——	26.0	52.0	78.0	104.0	130.0	156.0
Altax	1.5	1.5	1.5	1.5	1.5	1.5	1.5
DPG	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Sulfur	18.0	18.0	18.0	18.0	18.0	18.0	18.0
	210.0	236.0	262.0	288.0	314.0	343.0	366.0
Specific Gravity (Actual)							
90/325°F.	1.068	1.144	1.195	1.256	1.315	1.366	1.382
Tensile (psi)							
60/325°F.	2680	2780	2885	2415	2705	2705	2510
90	2835	2955	2790	2910	3045	3280	2735
120	3100	2985	3160	3120	3325	3340	3280
180	3085	3360	2780	3215	3445	3640	2760
240	3100	3280	——	3175	3480	3975	3275
Elongation (%)							
60/325°F.	90	105	75	90	170	135	125
90	85	100	130	130	105	95	40
120	105	100	100	70	85	60	45
180	90	100	110	70	60	50	25
240	70	80	——	65	60	45	35
Shore D Hardness							
60/325°F.	59	60	58	63	62	64	64
90	59	61	60	64	67	69	70
120	66	64	64	72	72	76	75
180	68	67	67	72	74	78	80
240	72	70	——	75	76	78	81
Olsen Stiffness (90/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)							
10°	1.9	2.5	2.4	3.9	4.5	5.0	5.3
20	3.8	5.1	4.8	7.3	8.5	9.0	9.4
30	5.8	7.0	6.8	10.1	11.3	12.5	13.0
40	7.7	9.9	8.2	12.4	13.0	14.5	15.3
50	9.0	10.2	8.7	13.5	14.1	15.5	16.5
60	9.6	10.9	9.7	14.1	15.3	16.0	17.7
70	9.6	10.9	10.2	14.1	15.3	16.0	18.3
80	10.0	11.5	10.1	13.5	14.7	15.5	18.3
90	10.0	11.5	10.1	12.9	14.1	14.5	17.7
Olsen Stiffness (180/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)							
10°	2.3	3.2	3.4	4.8	4.8	5.6	6.5
20	4.6	6.5	6.3	9.2	9.2	11.1	11.5
30	6.9	9.2	8.8	12.1	12.0	14.9	15.0
40	8.8	11.1	10.1	14.5	14.4	18.6	18.0
50	9.7	12.5	11.1	16.4	15.6	20.5	19.5
60	10.2	13.0	11.6	17.4	16.4	21.8	20.5
70	10.6	13.0	12.1	17.9	16.4	23.0	21.0
80	10.2	12.5	12.1	17.9	15.6	23.0	20.5
90	9.7	11.6	11.6	17.4	14.4	23.0	19.5
PHYSICAL DATA ON 5 x 8 x ½" BLOCKS							
Shore D Hardness							
90/325°F.	67	74	74	78	75	74	75
180	74	74	82	80	83	80	85
Unnotched Impact							
90/325°F.	DNB	DNB	DNB	DNB	DNB	DNB	DNB
180	DNB	DNB	15.2	13.2	DNB	15.3	4.6
Notched Impact							
90/325°F.	11.4	13.6	10.4	7.9	15.9	16.2	5.3
180	8.6	5.9	6.1	4.8	.58	1.0	.33
Heat Distortion—66 psi							
90/325°F.	138°F.	146°F.	150°F.	150°F.	143°F.	137°F.	137°F.
180	156°F.	160°F.	160°F.	160°F.	153°F.	156°F.	146°F.

DNB = Did not break—in excess of 16.7 foot lbs/inch.

20 PART SULFUR LEVEL

GR-S 1502	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Pliolite S6	90.0	90.0	90.0	90.0	90.0	90.0	90.0
Hard Clay	——	26.0	52.0	78.0	104.0	130.0	156.0
Altax	1.5	1.5	1.5	1.5	1.5	1.5	1.5
DPG	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Sulfur	20.0	20.0	20.0	20.0	20.0	20.0	20.0
	212.0	238.0	264.0	290.0	316.0	345.0	368.0
Specific Gravity (Actual)							
90/325°F.	1.192	1.150	1.230	1.285	1.329	1.422	1.380
Tensile (psi)							
60/325°F.	3000	2680	3660	3360	3420	2690	2890
90	3092	3525	3520	3680	3240	3485	3415
120	3245	3775	3795	4150	2975	3760	3780
180	3685	4050	3890	5580	4170	3975	4150
240	3805	4000	3925	5150	4070	4080	4430
Elongation (%)							
60/325°F.	100	80	110	100	100	40	65
90	105	100	90	80	50	40	60
120	110	100	80	60	30	35	50
180	100	100	70	20	60	25	35
240	90	80	75	20	20	20	25
Shore D Hardness							
60/325°F.	65	66	66	68	70	72	60
90	68	72	73	74	74	74	75
120	69	76	76	84	76	76	75
180	76	78	80	87	80	84	83
240	77	78	80	87	84	87	85
Olsen Stiffness (90/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)							
10°	3.5	6.2	6.1	5.4	4.8	6.5	5.0
20	7.0	11.8	12.3	9.0	9.2	12.5	9.5
30	10.5	17.0	17.2	15.6	12.6	16.5	13.0
40	13.0	20.3	20.9	22.4	14.8	20.0	16.0
50	15.0	22.6	23.4	26.7	16.3	22.0	17.5
60	16.0	24.3	25.2	29.8	17.4	23.5	19.0
70	16.5	25.4	26.2	30.5	17.4	24.5	19.5
80	16.5	25.4	27.0	30.5	17.4	25.5	20.0
90	16.0	24.8	27.0	29.2	17.0	26.0	20.0
Olsen Stiffness (180/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)							
10°	3.7	7.4	9.0	11.5	11.6	12.0	10.3
20	7.4	14.3	17.6	21.0	23.1	21.0	18.1
30	11.1	20.2	28.3	28.0	31.1	28.0	24.1
40	14.0	24.4	28.0	30.5	37.4	33.0	28.4
50	16.0	28.1	30.8	38.5	41.8	37.0	31.8
60	17.7	30.0	31.8	44.0	44.5	39.5	34.0
70	18.5	31.3	31.3	47.0	46.3	41.0	35.3
80	18.5	31.3	30.0	48.0	47.0	42.0	36.1
90	18.1	30.8	28.4	47.5	46.3	42.5	36.1
PHYSICAL DATA ON 5 x 8 x ½" BLOCKS							
Shore D Hardness							
90/325°F.	73	80	75	76	77	76	76
180	80	81	83	82	85	86	86
Unnotched Impact							
90/325°F.	DNB	DNB	DNB	DNB	16.1	16.5	16.2
180	16.3	DNB	DNB	4.8	4.0	2.0	2.2
Notched Impact							
90/325°F.	9.3	10.2	12.1	10.7	3.3	4.3	4.9
180	.67	.71	.80	.67	.25	.29	.33
Heat Distortion—66 psi							
90/325°F.	143°F.	145°F.	146°F.	145°F.	153°F.	151°F.	157°F.
180	142°F.	148°F.	149°F.	152°F.	154°F.	163°F.	161°F.

DNB = Did not break—in excess of 16.7 foot lbs/inch.

hard rubber manufacturer is the control of the exothermic reaction of sulfur and rubber which places restrictions on the gauge of the article being cured, curing temperature, and curing time cycle. Relief in this direction is always welcome.

It has already been pointed out that hard rubber stocks of a hardness equal to conventional hard rubber stocks can be achieved at lower sulfur levels through the use of high styrene reinforcing resin. This extension of the compound and reduction of sulfur would in itself help minimize the problem of scorching and heat generation. However, the effect is far greater than this, due to the unsaturation which exists in the reinforcing resin. In the particular resin used in this study, Pliolite S6, the unsaturation due to the butadiene content of the resin is approximately equal to 1 part of GR-S for each 7.5 parts of resin added, so that in reality, based upon unsaturation, the sulfur content is lower than indicated.

The effect of the resin on heat generation can be readily shown by the plot of temperatures made during the curing of selected samples during the course of this study. Thermocouples were embedded into the center of 5 x 8 x ½-inch blocks for measuring the actual temperature during the curing cycle. The results are given in Table IV and plotted in Figure 9. Only results of the 28 part sulfur stock are reported here, since it was the highest sulfur stock and most difficult to cure of the entire series. Examination of the results indicates that the resin has exerted a tremendous effect in suppressing the heat generation of the stock. Practical use might be made of this in obtaining more evenly cured pieces, curing heavier articles, or shortening the cure time on existing articles through the permitted use of higher curing temperatures.

One observation made throughout the entire study was that the resin-reinforced stocks had by far the best surface appearance. In spite of all precautions regarding the shape and weight of the mold charge, the resin bearing stocks always produced a superior surface appearance. Surface differences were greatest on the higher sulfur stocks as can be seen from the various test panels in Figure 10.

TABLE VI—EFFECT OF GROUND WHITING LOADING IN A RESIN-REINFORCED HARD RUBBER STOCK

18 PART SULFUR LEVEL

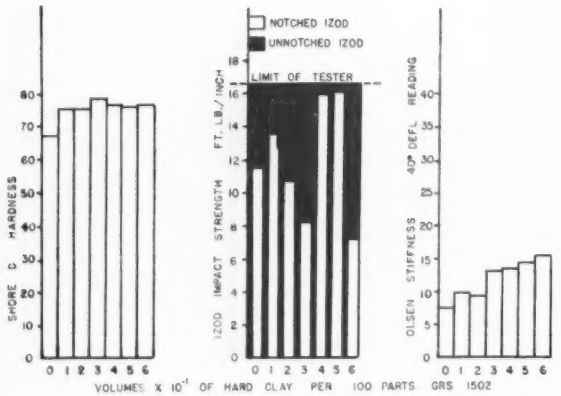
GR-S 1502	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Pliolite S6	90.0	90.0	90.0	90.0	90.0	90.0	90.0
Ground Whiting	—	27.0	54.0	81.0	108.0	135.0	161.0
Altax	1.5	1.5	1.5	1.5	1.5	1.5	1.5
DPG	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Sulfur	18.0	18.0	18.0	18.0	18.0	18.0	18.0
	210.0	237.0	264.0	291.0	318.0	345.0	371.0
Specific Gravity (Actual)							
90/325°F.	1.068	1.144	1.195	1.256	1.352	1.408	1.461
Tensile (psi)							
60/325°F.	2680	2640	2780	2220	2305	2325	2220
90	2835	2850	2795	2455	2295	2455	2270
120	3100	3055	2780	2740	2400	2250	2165
180	3085	2940	2930	2700	2540	2560	2205
240	3100	3140	2715	2830	2635	2730	2380
Elongation (%)							
60/325°F.	90	100	120	90	100	110	80
90	85	105	100	100	100	110	85
120	105	100	60	100	95	90	80
180	90	100	110	80	90	100	80
240	70	70	60	80	85	90	80
Shore D Hardness							
60/325°F.	59	60	64	65	67	65	68
90	59	61	65	66	71	69	73
120	66	65	66	68	74	69	74
180	68	66	72	70	76	74	76
240	72	73	74	73	78	76	78
Olsen Stiffness (90/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)							
10"	1.9	2.1	2.9	3.2	4.0	3.6	3.5
20	3.8	4.2	5.8	7.0	7.3	7.2	6.5
30	5.8	5.8	8.3	10.2	10.7	10.3	9.5
40	7.7	7.9	10.0	12.1	12.4	12.6	11.2
50	9.0	8.9	11.2	14.1	14.1	14.0	12.4
60	9.6	9.4	12.0	14.7	15.3	14.4	13.6
70	9.6	9.4	12.0	14.7	15.8	14.4	14.2
80	10.0	10.0	11.6	14.7	16.4	14.4	14.2
90	10.0	9.4	10.4	14.1	16.4	14.0	14.2
Olsen Stiffness (180/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)							
10"	2.3	3.9	5.4	4.9	5.1	4.3	5.9
20	4.6	8.2	10.9	9.3	9.6	7.3	10.0
30	6.9	11.6	15.2	12.5	13.6	10.3	14.2
40	8.8	14.2	18.5	15.2	15.8	12.0	16.5
50	9.7	15.9	20.1	16.9	17.5	13.3	18.3
60	10.2	16.8	21.2	18.0	18.6	13.8	18.8
70	10.6	17.2	21.2	18.0	19.2	14.2	19.5
80	10.2	17.2	21.2	18.5	19.2	14.2	19.5
90	9.7	16.8	20.6	18.0	19.2	13.3	19.5
PHYSICAL DATA ON 5 x 8 x ½" BLOCKS							
Shore D Hardness							
90/325°F.	67	70	71	75	79	75	74
180	74	75	75	79	80	80	80
Unnotched Impact							
90/325°F.	DNB	DNB	DNB	DNB	DNB	DNB	DNB
180	DNB	DNB	DNB	DNB	15.9	DNB	9.3
Notched Impact							
90/325°F.	11.4	9.6	8.7	8.8	6.1	7.9	7.1
180	8.6	5.6	5.4	5.9	3.9	4.5	2.2
Heat Distortion—66 psi							
90/325°F.	138°F.	164°F.	148°F.	159°F.	152°F.	150°F.	155°F.
180	156°F.	152°F.	163°F.	169°F.	152°F.	144°F.	153°F.

DNB = Did not break—in excess of 16.7 foot lbs/inch.

20 PART SULFUR LEVEL

GR-S 1502	100.0	100.0	100.0	100.0
Pliolite S6	90.0	90.0	90.0	90.0
Ground Whiting	—	27.0	54.0	81.0
Altax	1.5	1.5	1.5	1.5
DPG	0.5	0.5	0.5	0.5
Sulfur	20.0	20.0	20.0	20.0
	212.0	239.0	266.0	293.0
Specific Gravity (Actual)				
90/325°F.	1.092	1.152	1.221	1.291
Tensile (psi)				
60/325°F.	3000	2855	2870	2720
90	2095	3240	3085	2745
120	3245	3340	2995	2895
180	3685	3500	3090	3095
240	3805	3380	3340	3140
Elongation (%)				
60/325°F.	100	95	110	105
90	105	100	105	90
120	110	90	100	95
180	100	90	90	80
240	90	70	85	75
Shore D Hardness				
60/325°F.	65	69	69	69
90	68	72	72	72
120	69	72	72	74
180	76	72	75	78
240	77	77	78	81
Olsen Stiffness (90/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)				
10"	3.5	6.1	4.2	5.3
20	7.0	11.7	7.8	10.2
30	10.5	16.6	11.4	13.6
40	13.0	20.3	13.5	16.5
50	15.0	22.8	15.1	18.3
60	16.0	24.0	15.6	19.5
70	16.5	24.0	15.1	19.5
80	16.5	22.3	14.6	19.5
90	16.0	19.1	—	18.9
Olsen Stiffness (180/325°F.—1 x 4 x .075"—8 in/lb.—Load Scale Reading)				
10"	3.7	7.0	6.0	5.9
20	7.4	14.0	11.5	10.8
30	11.1	19.9	15.5	16.2
40	14.0	25.1	18.5	18.9
50	16.0	28.0	20.0	21.1
60	17.7	29.9	20.0	22.7
70	18.5	31.0	20.5	23.3
80	18.5	31.6	19.5	23.3
90	18.1	31.0	18.0	23.3
PHYSICAL DATA ON 5 x 8 x ½" BLOCKS				
Shore D Hardness				
90/325°F.	73	75	80	79
180	80	81	82	80
Unnotched Impact				
90/325°F.	DNB	DNB	DNB	DNB
180	16.3	15.8	14.5	14.3
Notched Impact				
90/325°F.	9.3	2.7	2.2	5.2
180	.67	.92	.79	1.3
Heat Distortion—66 psi				
90/325°F.	143°F.	150°F.	152°F	154°F.
180	142°F.	143°F.	150°F	149°F.

DNB = Did not break—in excess of 16.7 foot lbs/inch.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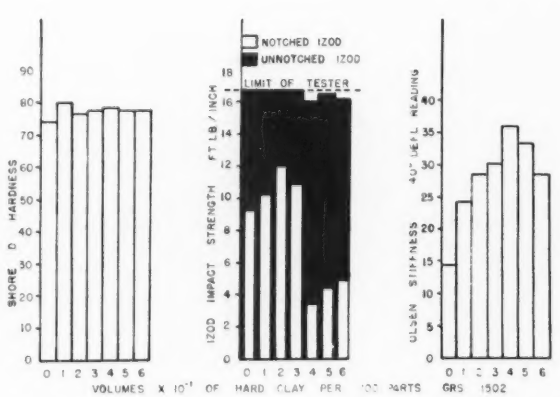
SHORE D HARDNESS
IZOD IMPACT STRENGTH FT LB/INCH
OLSEN STIFFNESS 40° DEFL READING
VOLUMES X 10⁻¹ OF HARD CLAY PER 100 PARTS GRS 1502

FIG. 11—Effect of hard clay incorporation into resin-reinforced hard rubber stocks—Formula B. (Cure: 90/325°F.).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SHORE D HARDNESS
IZOD IMPACT STRENGTH FT LB/INCH
OLSEN STIFFNESS 40° DEFL READING
VOLUMES X 10⁻¹ OF HARD CLAY PER 100 PARTS GRS 1502

FIG. 12—Effect of hard clay incorporation into resin-reinforced hard rubber stocks—Formula C. (Cure: 90/325°F.).

Compounding Possibilities

It is realized that to this point in the study basic non-loaded stocks have been used to more clearly demonstrate the effects of the resin. These stocks are not too representative of production hard rubber stocks and highly loaded resin stocks would be prohibitive from a cost standpoint, if it were not possible to reduce cost through loading with cheap filler pigments. Tables V and VI present loading studies on resin-reinforced hard rubber stocks. Two formulas—B and C, shown in Table I—were used in this phase of the study. These formulas were selected because they represented the best balance of impact strength, hardness, and stiffness based upon the prior study. Two selected pigments, representative of both the reinforcing and filler types, were used in the study. To these stocks were added as high as 60 volumes of pigment based upon 100 parts of GR-S.

For ease of interpretation, the hardness and impact strength for hard clay loading is plotted on Figures 11 and 12. It is apparent in observing these charts that the resin-reinforced stocks will tolerate considerable loading before the impact values have degenerated past a usable stage. The pigmentation meanwhile has contributed somewhat to increased stiffness, increased heat distortion point, and lower cost.

Resin-reinforced stocks can be utilized in a large number of applications where increased impact strength is desired. Table VII shows representative hard rubber stocks compounded using high styrene resin for reinforcement.

Conclusions

The information reported herein opens a number of interesting avenues of investigation for the hard rubber manufacturer.

First, it makes possible the production of higher impact strength hard rubber stocks and possibly expanded use of hard rubber.

Second, it makes possible the utilization of a range of sulfur levels heretofore of only limited value in hard rubber manufacture.

Third, it provides a means of controlling the exothermic curing reaction, so troublesome in hard rubber manufacture, without sacrifice in physical properties. Or conversely, it affords a means of curing thicker sections, or using faster cures, without the danger of charring.

Finally, the addition of the high styrene reinforcing resin is actually of benefit in improving the milling and stock preform operations, as well as the finished cured stock surface appearance.

The authors realize that this study has but scratched the surface in evaluating and presenting potential values of high styrene reinforcing resins in hard rubber stocks. It is hoped that the work presented here will stimulate further work and applications in this field.

ACKNOWLEDGMENT

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TABLE VII—TYPICAL RESIN-REINFORCED HARD RUBBER STOCKS

GR-S 1502	100.0	100.0	100.0	100.0	100.0
Pliolite S6	90.0	90.0	60.0	60.0	20.0
Resin No. 9718	—	20.0	—	—	—
Hard Rubber Dust	—	—	—	60.0	—
Hard Clay	105.0	105.0	60.0	—	—
Silene EF	—	—	—	—	50.0
Cumar MH 2½	—	—	—	—	3.0
Light Process Oil	—	—	—	—	3.0
Altax	1.5	1.5	1.5	1.5	1.5
DPG	0.5	0.5	0.5	0.5	0.2
Sulfur	18.0	18.0	19.0	25.0	35.0
	315.0	335.0	241.0	247.0	212.7
Specific Gravity (Actual)					
90/325°F.	1.327	1.327	—	1.149	1.293
Tensile (psi)					
60/325°F.	3030	3890	2475	2505	2735
90	3475	4030	2565	2840	6080
120	3630	4310	2720	3165	6550
180	3795	4530	3415	3530	6720
240	3690	4200	2790	4220	6860
Elongation (%)					
60/325°F.	150	60	75	60	50
90	80	60	55	50	—
120	80	50	60	50	—
180	80	50	50	50	—
240	50	40	30	30	—
Shore D Hardness					
60/325°F.	65	73	68	64	73
90	72	77	73	70	85
120	74	80	77	75	87
180	78	80	80	76	88
240	78	81	82	81	91
Olsen Stiffness (90/325°F.—1 x 4 x .075"—8 in./lb.—Load Scale Reading)					
10°	4.3	4.3	3.1	3.0	24.0
20	8.6	8.6	5.7	7.0	46.0
30	12.5	13.0	6.7	9.0	66.0
40	14.9	16.7	8.2	11.0	83.0
50	16.8	19.4	9.3	12.0	96.0
60	18.2	21.0	9.5	13.0	105.0
70	18.2	21.6	9.5	14.0	108.0
80	17.8	22.1	9.3	14.0	—
90	16.8	22.7	9.0	14.0	—
Olsen Stiffness (180/325°F.—1 x 4 x .075"—8 in./lb.—Load Scale Reading)					
10°	4.7	4.5	5.1	6.0	28.0
20	8.8	10.2	9.0	12.0	56.0
30	12.5	16.4	11.9	17.0	82.0
40	15.1	20.9	14.3	21.0	103.0
50	17.7	23.3	15.5	24.0	119.0
60	18.7	25.0	16.1	26.0	128.0
70	19.8	25.8	16.4	27.0	—
80	20.3	26.7	16.1	27.0	—
90	20.3	24.6	15.6	27.0	—
PHYSICAL DATA ON 5 x 8 x ½" BLOCKS					
Shore D Hardness					
90/325°F.	76	80	72	79	87
180	—	—	82	—	90
Unnotched Impact					
90/325°F.	16.3	15.7	DNB	DNB	3.1
180	—	—	1.96	—	3.0
Notched Impact					
90/325°F.	7.9	1.9	1.42	1.17	.50
180	—	—	.46	—	.50
Heat Distortion—66 psi					
90/325°F.	151°	163°	148°	148°	176°
180	—	—	146°	—	—

DNB = Did not break—in excess of 16.7 foot lbs/inch.

Spark-Proof Flooring

The Mechanical Goods Division of the U. S. Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y., is manufacturing a spark-proof flooring for use in hospital operating rooms, laboratories and munition plants, where highly explosive material is used or stored. The company has announced that the new flooring has been tested and approved by Underwriters' Laboratories, Inc., and also meets the safety requirements of the National Fire Protection Association. Made of a special long wearing compound of conductive synthetic rubber and fabric, the flooring dissipates static electricity which might ignite highly inflammable gases. Since there are no wires in the flooring, no grounding is necessary and equipment may be rolled freely over it. The rubber is said to be resistant to blood, sulfur, ether, etc. It is long wearing and easy to clean.

The Ammonia-Resistant Bacteria Associated with Latex Deterioration

By C. E. RHINES* and J. McGAVACK†

Early development of the natural latex industry was accompanied by serious latex quality problems. The product originating through early development work was variable, unstable and foul in odor. Many producers have not escaped the troubles right up to contemporary times. The major cause of trouble lay in the general belief that the ammonia preservative universally used was adequate to destroy all life. Ammonia-resistant bacteria have been demonstrated to be the major cause of spoilage. These organisms developed only in the presence of free ammonia. Control was achieved through use of adequate preservative and through diligent application of plant sanitation. The plating method utilized to demonstrate the ammonia-resistant bacteria has been presented in detail. The medium used consists primarily of nutrient agar. Natural rubber latex should be uniform, stable, pleasant in odor, and have a storage potential of many years.

NATURAL rubber latex attained a position of importance in industry because of an unrivaled assortment of desirable properties. Latex is a dispersion of rubber hydrocarbon in water and normally supplied as a centrifuged or creamed concentrate. A unique value of cream lies in the high solids content commercially available, 68%. Liquid latex is converted readily to strong rubber coagulum. The wet coagulum has extreme toughness, contrasting sharply with the weak wet coagulum of synthetic latices. Products from latex are characterized by high quality, being tough and of excellent aging properties. Natural rubber latex has outstanding adhesive properties in many uses.

Bulk shipment of natural latex attained significant volume about 1930. During the early period of the latex industry's history, no trouble in preservation was encountered and the belief became prevalent that bacteria could not possibly live in the presence of the usual ammonia preservative. The situation changed drastically in the early 30's, when industrial development of latex was getting under way. Control tests were devised with industrial use and it became evident that currently produced latex was an extremely variable product. Processors objected drastically to the low and variable stability encountered. The KOH-number test was introduced *(1)* as a compounding control and high values were invariably encountered whereas low KOH-value latex was desired.

Many latex manufacturing processes require extreme technical control and the varied latex properties, especially with the low-quality latex of the day, led to many shut-downs for adjusting processing to each new batch of raw material and also to much scrap production. The most disturbing problem of all, however, was odor. The natural rubber latex of the times was characterized by a foul stench that threatened to block its use in important products, such as wearing apparel or foam for home use. With this situation prevailing, an investigation was undertaken to learn the fundamental principles of the preservation process.

Latex as a Medium for Growth of Bacteria

Latex is somewhat related to milk in its susceptibility to microbial attack. The fresh product contains an abundance of protein, some free amino acid (primarily alanine, the sugar-like compound), quebrachitol, small amounts of other organic compounds that promote growth of microorganisms, and an ample supply of essential minerals. Latex is sterile in the latex vessels of the tree but is contaminated to the extent of many thousands of bacteria per cc. on tapping, and in a few hours the count increases to several million, whereupon acid formation, coagulation and putrefaction occur. The bacteria that flourish in fresh latex bring a need for immediate and effective preservation if the product is to be salvaged for use in the liquid form.

Very inadequately preserved ammonia latex is characterized by a high content of volatile fatty acids. A volatile acid determination is now commonly applied at latex producing stations to check the efficiency of the early preservation process. This quick spoilage phenomenon appears to be due to the normal bacterial flora of fresh latex that damage before preservation and after preservation, when a very inadequate level of ammonia is added.

Fresh latex is stabilized from coagulation by the natural protein content. The protein flocculates on bringing to a pH range of approximately 5.0. Raising the alkalinity to pH 9 to 10 greatly enhances stabilization. The need for preservation lies to a large extent with this protein stabilizer. Bacteriological destruction of this protein drastically reduces latex stability, and sometimes leads to coagulation, even at alkaline reactions. Natural soaps form in latex by saponification of normal lipoidal components and become important aids to stability a few weeks after ammoniation, but the protein content and condition are always prominent factors controlling stability and determining response to coagulants.

Latex protein is relatively stable to alkaline conditions but excessive alkalinity leads invariably to excessive hydrolysis and modified physical properties. Strong base preservatives, like potassium hydroxide, have not retained prominence as latex preservatives, although they figured extensively in early latex history. A great disadvantage was rapid destruction of protein. The excellent processing characteristics of natural rubber latex is to a considerable extent due to the natural protein component and successful preservation demands stabilization of this protein fraction.

Early shipment of latex was commonly carried out after simply adding 0.4 to 0.5% ammonia to normal

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latex. The product, customarily shipped at 38 to 40% total solids content, contained about 0.7% ammonia on the water phase. Completely satisfactory preservation was reported. Troubles developed with the new industry, however, and shippers began to use more ammonia but the troubles (poor stability and foul odor) were not eliminated. Bacteriological investigations carried out at various places continued to classify ammoniated latex as a sterile product.

A very unusual group of latex organisms were discovered at our Sumatra Plantations and this discovery aided materially in bringing latex preservation under control. Ammonia preservative was added to nutrient agar plates, and latices, previously classified sterile on ordinary bacteriological media, were found to be teeming with bacteria. A free ammonia content was absolutely essential for the development of these organisms. These organisms, long associated with latex handling plants, had adapted themselves to extremely ammoniacal media. It was further demonstrated that latex with these organisms was highly infectious for fresh ammonia latex and rapidly catalyzed deterioration.

The organisms associated with latex spoilage are a highly attenuated group. Once transferred to bacteriological media, they lose their high capacity to destroy latex, and their infectious action is slowly regained by culturing in ammonia latex. Crude cultures of bacteria, from soil and coagulating latex, are entirely ineffective deteriorating agents for ordinary ammoniated latex, but these crude strains, carried in low ammonia content latex, gradually build up capacity to grow at higher ammonia contents. In a small experimental set-up, it appears to take some years to build up strains to a point where latex containing 2% ammonia on the water phase is damaged, but large plants favor and hasten the adaptation or mutation process, simply because more organisms are under culture.

Infectious Character of Spoilage Process

Results of the first experiment ever carried out showing clearly the infectious nature of the spoilage process are shown in Table I. The method will be described later. An ammonia-preserved centrifuge concentrate was sterilized by heating to 90°C. in an Arnold sterilizer. A portion of the latex was inoculated with spoiled latex and another portion was left uninoculated. The latex had a total solids content of 63% and a 0.27% ammonia content.

Another experiment closely duplicating the above test illustrated spoilage at a higher ammonia content (Table II) and revealed the association of ammonia-resistant bacteria with spoilage. The total solids value was 62% and ammonia content as indicated in the table.

These experiments show clearly that inoculation has greatly increased the rate of acid formation and foul odor development. Many other experiments of a similar type have been carried out and have established the infectious nature of the spoilage process.

TABLE I—CHANGES IN HEAT-STERILIZED CONCENTRATED CENTRIFUGED LATEX

Sterile Sample			Inoculated Sample		
Age in Days	KOH Number	Film Odor	Age in Days	KOH Number	Film Odor
2	0.33	Good	2	0.33	Good
9	0.37	Good	9	0.50	Foul
18	0.39	Good	18	0.60	Foul

Control of Bacteria in Latex

Preservative, in adequate quantity, must be applied quickly to fresh latex to check the normal flora. The normal microorganisms are quite easily inactivated by moderate ammonia levels, and reasonable diligence in applying preservative prevents trouble from this source. Carelessness can lead quickly to foul and unstable latex and to coagulum formation.

The more difficult phase of preservation is encountered after the usual ammonia preservative has been added. Latex shippers have traditionally suffered heavy damage in their products after adding ammonia levels believed adequate to render the product sterile. Two measures must be applied to assure an undamaged product. First, the preservative content must be kept high to limit damage and to check the evolution process that leads to highly resistant strains. Where ammonia is the only preservative, a content slightly over 2% on the water phase is advisable. Second, a sanitary code must be established for all latex equipment.

The manufacturing consumer continues to demand a uniform, sweet smelling and stable product. Uniformity is attained by extensive bulking at the plantations and by highly standardized processing and preservation. A demand has developed for extremely high solids content, fluid latices, and these are available at 68% solids. A demand has persisted for latices with lower ammonia contents and these products are coming into production. Reduction in ammonia must be accompanied by incorporation of a supplementary preservative. Latex plants require non-toxic or very-low-toxicity preservatives because of hazards to the ultimate consumer associated with some preservative materials. Low ammonia contents aid manufacturing operations and lessened alkalinity reduces damage to the important natural protein stabilizer.

The formaldehyde-ammonia process *(2)* has been applied extensively in latex production and continues to yield a superior product. A formaldehyde treatment prior to ammoniation modifies nitrogenous components and greatly reduces susceptibility to microbial attack.

TABLE II—AMMONIA-RESISTANT BACTERIA ASSOCIATED WITH LATEX SPOILAGE

Sterile Sample 0.4% Ammonia				Inoculated Sample 0.4% Ammonia			
Age in Days	KOH Number	Film Odor	Ammonia Resistant Bacteria, per cc.	Age in Days	KOH Number	Film Odor	Ammonia Resistant Bacteria, per cc.
2	.39	Good	..	2	.39	Good	..
53	.42	Good	0	53	.54	Foul	8,000,000
Sterile Sample 0.6% Ammonia				**Inoculated Sample 0.6% Ammonia**			
2	.40	Good	..	2	.40	Good	..
53	.47	Good	0	53	.53	Foul	17,000

Detection of Ammonia-Resistant Bacteria

The medium used consists of nutrient agar to which sterile glucose solution and cream serum from 1.25% ammonia normal latex are added just before plating. 5 cc. of 20% glucose solution and 50 cc. of serum being combined with 200 cc. of melted agar. To prepare the agar, 8 grams of dehydrated nutrient broth or 5 grams of peptone plus 3 grams of beef extract are first dissolved in 300 cc. of water. Ammonia solution is added until the broth solution is strongly alkaline and has a distinct ammoniacal odor. This ammoniated broth is allowed to stand overnight in a refrigerator. A considerable amount of precipitate forms. This is removed by filtration. The filtrate is boiled down to about 100 cc. to drive off the ammonia (to prevent agar hydrolysis during sterilizing) and leave a neutral broth. The removal of the ammonia-precipitable material, probably magnesium ammonium phosphate, is not essential but eliminates the very troublesome crystals from the final agar medium. The nutrient broth solution is then mixed with sufficient water to make one liter and brought to a boil. Twenty grams of granular Bacto agar are dissolved in the broth to give the nutrient agar used. Two hundred cc. portions of this nutrient agar are sterilized in 300 cc. Erlenmeyer flasks at 15 pounds pressure for 30 minutes.

Normal latex preserved with 1.25% ammonia is obtained directly from a collecting station. Sufficient ammonium alginate is added to give 0.15% on the water. After thorough shaking, creaming is allowed to proceed for 24 hours. The clear serum is syphoned into bottles and stored in a refrigerator until used.

In preparing the medium for plating, the nutrient agar is melted by placing in boiling water. This water should be kept boiling for 15 to 25 minutes after the agar has become clear or apparently melted, to reduce the possibility of lumpy agar. The melted agar is placed in a 45°C. water bath and held there, with occasional swirling, for at least 30 minutes. If a thermometer placed next to the flask in the water bath registers higher than 45°C., cooling is continued for a longer period. Having the agar properly cooled is much more important than for ordinary media, because the ammonia present increases the danger of death by heat.

While the agar is being melted, 50 cc. of serum are placed in a sterile 100 cc. Erlenmeyer flask with sterile rubber stopper tied in place. The flask is placed in a 60°C. water bath for 30 minutes to assure sterility of the serum. The serum is cooled by placing for 30 minutes in a 40°C. water bath. In preparing the agar and serum any shaking which causes foam formation should be avoided since foam introduces bubbles into the agar plates. The cooled, 50 cc. portion of serum is poured carefully, to avoid bubbles, into the agar at 45°C. The necks of the flasks are flamed as for usual bacteriological operations before the transfer. Five cc. of sterile 20% glucose solution, autoclaved at 15 pounds for 20 minutes, is then added to the medium. The flask is gently swirled to mix the nutrient agar, serum, and glucose solution and poured into previously-prepared Petri dishes containing 1 cc. portions of inoculum from diluted ammonia latex. About 15 cc. of agar per plate are added and the inoculum is thoroughly mixed with the medium by tilting and rotating the plates.

After the agar has set, the plates are inverted and placed in anaerobic jars. Iron drums or large vacuum desiccators are satisfactory. By means of a water pump, three-fourths of the air is removed from the anaerobic jar and nitrogen (or hydrogen) allowed to flow in rapidly until atmospheric pressure is restored. This evacuation and filling with nitrogen is repeated three more times. The extent of evacuation is checked by means of a manometer. An escape valve (an outlet tube dipped in water) is provided for the nitrogen line to prevent blowing the top from the anaerobic jar by building up a gas pressure greater than atmospheric. Escape of nitrogen through the valve also indicates when the container is filled to the proper pressure.

It is desirable to place an open bottle with about 300 cc. of 1/10% ammonia in each Petri dish container. This helps maintain the ammonia content of the medium. An ammoniacal condition is absolutely essential for growth of these troublesome latex bacteria. Latex samples yielding negative counts on neutral media have been found to teem with bacteria when examined with ammoniacal nutrient agar.

The first ammonia-resistant bacteria observed were obligate anaerobes but later trials revealed the presence of both aerobic and anaerobic forms. The aerobic plating method has been used successfully to follow the bacterial trends in deteriorating latex. Provision must be made to maintain the ammonia content of the plating medium throughout the incubation period.

Three weeks of incubation are required for a reasonable development of colonies on the ammoniacal medium and four weeks brings the tiny colonies to a size easier to observe and count. A hand lens greatly facilitates counting. 28°C. is the recommended incubation temperature.

LITERATURE REFERENCES

(1) Jordan, H. F., "Proceedings of the Rubber Technology Conference, 1938," pp. 111-25, W. Heffer & Sons, Ltd., Cambridge, England.
(2) McGavack, J., U. S. Pat. 1,872,161.

In the next issue...

we will publish the first in a series of reports on the rubber industry in Europe. These reports, based on the recent eight-week trip of our editor to England and the Continent, will be amply illustrated. Watch for them!

RUBBER AGE

Editorials . . .

Tax Facet

ALTHOUGH not too much has appeared in the public print in the past several weeks concerning the activities of the Synthetic Rubber Producing Facilities Disposal Commission, the silence is not indicative of inactivity. Government and industry officials have been huddling off and on, wrestling with cost figures, and the stage is rapidly being set for contract signings. Although the Commission has another few months before it must complete a wrap-up package for presentation to Congress, its members are rather anxious to conclude actual contracts, provided it can secure "fair value" for the various facilities involved.

As repeatedly stated in these columns, the entire rubber manufacturing industry is eagerly awaiting the outcome of current negotiations and the presentation of a full disposal plan to the legislators. As stated last month, this interest is shared by many rubber manufacturers in Europe, who sooner or later will be faced with the problem of either continuing to rely on the United States and Canada for their supplies of synthetic rubber or building their own facilities in their own back yards. Non-rubber interests are also watching developments keenly, including tax assessors and collectors in the various communities where the government-owned synthetic rubber plants are located.

For example, the tax assessor-collector of Harris County in Texas has publicly stated that when and if the five synthetic rubber units in the county are sold to private industry, he will begin a reassessing program designed to increase tax revenue from the plants. These plants include the copolymer facilities operated by Goodyear at Houston and General Tire at Baytown; the Butyl rubber unit operated by Humble Oil at Baytown, and the butadiene facilities operated at Houston by Sinclair Rubber and at Baytown by Humble Oil. The net book value of the five plants is $33,029,000, while their assessed value is $9,677,710.

Government-owned property is ordinarily exempt from taxation, and this situation applied in Harris County when the plants were first constructed. However, special legislation was eventually passed to permit both the state and county to tax the real property on which the plants were located. According to the Harris County authorities, the improvements on the property are far more valuable than the land, but the county cannot tax the improvements as long as the government owns them. The county argues that this is unfair treatment, since it had to provide services for all the extra workers attracted to the area by the plants.

No tremendous tax amounts are involved in the Harris County affair. Based on this year's tax rate of $1.49 per $100 valuation, the five plants concerned will provide approximately $145,000 in real property tax revenues for the county. If the plants are sold to private industry and taxes apply on both real and personal property, the amount at this year's tax rate may total $250,000. Harris County tax authorities are reluctant to specify any figure until an engineering survey is made, but concede it might add up to another $100,000. Similar situations undoubtedly apply in other communities where the synthetic rubber facilities are located.

Although the tax amounts outlined above will have little or no bearing on negotiations for the government-owned facilities, they point up an interesting question on hidden operating costs for the potential purchasers. They are still another reason why many rubber consumers are convinced that the price of synthetic rubber will be increased over existing levels as, if and when private industry takes over these facilities. Although the eventual costs of the basic raw materials, particularly butadiene and styrene, will dictate the price of the polymers, the several not-too-well-disclosed operating costs will play their part in such price. As to the price itself, it is still a guessing game, but one hears more and more of a 26 to 28-cent range.

Just for the record, the Disposal Commission may continue negotiations with prospective purchasers through December 27 of this year. Under the terms of disposal legislation, it must submit a complete report to Congress before January 27, 1955. The sale of any facility will not become an actuality until the entire program receives Congressional approval. Failing such approval, the production and distribution of synthetic rubber will remain with the government until further legislation is enacted.

Highlights Sidelights *of the News . . .*

September, 1954

Declining sales will mark the synthetic rubber picture in the next few months according to the Federal Facilities Corporation . . . Estimated sales of synthetic rubber in November at 43,000 long tons will be 7% below the estimate for October . . . Synthetic production in September, October and November has been set at 40,500 long tons each month (page 857).

The Secretariat of the International Rubber Study Group advises that world output of natural rubber in the first six months of this year declined 1.5% from output in the first six months of last year, but consumption in the first half of 1954 was 4% above consumption in the first half of 1953 (page 857).

Settlement of the Goodyear strike on August 27 set the expected pattern for the industry . . . Goodrich, U. S. Rubber, Firestone, General Tire and others have now concluded new contracts with the U.R.W. . . . Wage increases average 6 1/2¢ an hour (page 861).

The past few months have seen a growing interest in the polyurethane foams . . . A new American company, American Collo Corp., an affiliate of Collo Rheincollodium, Cologne, Germany, is now actively engaged in marketing a line of household items made of this material (page 866).

The sale of the synthetic rubber facilities to private industry will create a serious marketing problem in the view of the Rubber Trade Association of New York . . . In a recent letter to bidders for the synthetic facilities, RTA set forth a plan whereby its member dealers would expand their activities to encompass the marketing of synthetic rubber (page 868).

A new corporate entity has entered the carbon black field—Continental Carbon Corp.—and has acquired world rights to the Lynn-Furmatic process for the manufacture of carbon black . . . It is claimed that the average increase in total yield attained through the use of the Lynn process is in the order of 40 to 50% (page 860).

NEWS REPORTS and Industry Activities

FFC PREDICTS LOWER GR-S SALES IN NOVEMBER; WORLD NATURAL RUBBER PRODUCTION DECLINING

THE Federal Facilities Corporation, operator of the government's synthetic rubber facilities, has estimated its sales of synthetic rubber in November, 1954, at 43,000 long tons, 7% below the estimate for October. November's production, FFC announced, will be 40,500 long tons, the same as in October. The agency revised downward its previous production estimate for October of 42,200 long tons.

World production of natural rubber totaled 132,500 long tons in June of this year compared with 137,500 long tons in June of 1953, according to estimates of the Secretariat of the International Rubber Study Group announced by the Business and Defense Services Administration of the U. S. Department of Commerce. Output in the first six months of 1954 was placed at 815,000 long tons, only 1.5% below the 827,500 tons recorded in the first six months of the preceding year.

In announcing its sales estimates for the coming months, FFC also cut back its sales figures for September to 44,000 tons. These sales estimates are based on orders by large customers who are required to make firm commitments 90 days in advance of delivery. For September, October and November, FFC estimated output at 121,500 long tons and sales at 133,000 long tons. FFC stated that the industry strikes might cause "noticeable" changes in its future estimates, but the full effect could not be determined yet.

The following table sets forth the estimates of FFC's production and sales for the three-month period ending November, 1954 (the figures include the oil used in oil-extended rubbers, but exclude the carbon black masterbatches):

Month	Production	Sales
September	40,500	44,000
October	40,500	46,000
November	40,500	43,000

The trade believes that the impact of the strikes on the government's program can be measured in two ways, the loss in production of synthetic rubber and the loss in sales due to contract cancellations by the struck consuming firms. The production loss, government officials say, is very small. It seems likely however, that the struck firms, which had been accumulating rubber in storage, may cut back their orders for subsequent months since tire inventories were relatively heavy at the start of the strikes and are still reported to be fairly comfortable.

As for the natural rubber situation, world consumption was estimated at 140,000 long tons in June, 1954, as against 132,500 tons in June, 1953. The January-June, 1954, total of 850,000 long tons was up 4% from the January-June, 1953, total of 817,500 long tons.

Imports of rubber into Russia and China, included in the foregoing consumption figures, were estimated at 3,625 long tons in June, 1954, 5,000 tons in June, 1953, 30,700 long tons in the first six months of 1954, and 74,750 long tons in the first six months of 1953.

Down 50,000 long tons from the December 31, 1953, position, world stocks of natural rubber at the end of June were estimated at 780,000 long tons, consisting of 242,500 long tons in producing countries, 390,000 long tons in consuming countries (excluding Russian and Chinese stocks and government stocks in the United States, the United Kingdom and France), and 147,500 long tons afloat.

Excluding Russia, world synthetic rubber operations in June, 1954, saw production at 52,500 long tons and consumption at 65,000 long tons. As of June 30, 1954, stocks totaled 182,500 long tons, down 17,500 long tons from December 31, 1953. In June of 1953 production was 87,313 long tons and consumption was 80,000 long tons.

In the first six months of this year world synthetic output was 352,500 long tons, and consumption was 365,000 long tons. In the corresponding period of 1953, output was 509,715 long tons and consumption was 485,000 long tons.

World consumption of both natural and synthetic rubber totaled 1,215,000 long tons in the first six months of 1954, as against 1,302,500 long tons in the comparable period of 1953. Consumption in the United States declined to 623,025 long tons from 730,430 long tons, but foreign consumption, excluding Russia and China, expanded to 561,300 long tons from 497,300 long tons.

Film-Wrapped GR-S

In a memorandum dated August 19, 1954, FFC recalled that in another memorandum to rubber consumers dated June 5, 1954, it had advised that film-wrapping machines had been installed in certain of the GR-S producing plants and that a limited supply of GR-S would be wrapped in polyethylene film. The June 5 memorandum further advised prospective purchasers who wished their GR-S to be film-wrapped in large unit containers to incorporate on their purchase orders the paragraph waiving all rights and claims for damages due to this method of packing. Since that time, FFC has installed additional film-wrapping machines and is now in a position to furnish larger quantities of GR-S packaged in this manner.

The volume of shipments in unit containers has increased to the point where it is felt that this type of package should no longer be considered experimental. Accordingly, FFC advises, effective commencing with orders issued for shipment during the month of September, 1954, the waiver of rights to claim for damages due to this method of packaging is no longer necessary.

The problem of package adhesion on talced and bagged rubber has been a serious one, FFC stated, particularly in the case of rubber warehoused for an extended time. This problem has been unusually serious in the case of polymers GR-S 1500, 1501 and 1502. In order to improve its package and avoid the adhesion problem in these types, FFC has wrapped and placed in three-ply bags quantities of these types. When so packaged, they are known as GR-S 1500-F, 1501-F and 1502-F. FFC warehoused stocks of GR-S 1500, 1501 and 1502 packaged in talc and three-ply paper bags have now been replaced with the stocks of the F-types, and these latter types are now available for distribution in the normal rotation of the FFC inventory.

In connection with the use of its film-wrapping machines, FFC has adopted the following policy: (1) Make shipments of

film-wrapped rubber in large unit containers when requested, to the extent possible; (2) Wrap in polyethylene film and place in three-ply paper bags the GR-S 1500-F, 1501-F and 1502-F for warehoused stocks; (3) Wrap in polyethylene and place in paper bags such additional quantities of various polymers as FFC capacity will allow and as are specifically requested by consumers.

FFC also stated that it will package GR-S 1500, 1501 and 1502 in talc and paper bags for those consumers who cannot use film-wrapped rubber. The government agency states that film-wrapped types of rubber packaged in large unit containers or bags offer advantages to any company having unit handling equipment and using Banbury mixers to process rubber. FFC requests that purchasers include on their purchase orders the type of package required. In the case of those requesting the above-mentioned three polymers to be film-wrapped in large unit containers, FFC will assume that they can also use the F-types when it is necessary to rotate stocks from inventory.

Removed From Restricted List

Seventeen listings in rubber and rubber products are among items recently dropped from the restricted goods in American trade with Iron Curtain countries. According to Harold E. Stassen, Foreign Operations Administration director, the U. S. and 14 cooperating nations have removed non-military types of tires from the embargo list "inasmuch as the Soviet bloc production of most types of tires is adequate to meet its needs."

Natural rubber remains under "careful surveillance" in the list of goods still restricted. Mr. Stassen revealed that Butyl rubber and "water lubricated bearings made with buna-N compounds" are still embargoed.

Still requiring export licenses are: natural rubber; S-type synthetics; Butyl rubber; silicone rubber; truck and bus tires of combat or run-flat construction; all 9.00 by 16 sizes eight-ply and over; all 3.4 by 7 in ten-ply and up; all 12.00 by 20 and 14.00 by 20 in twelve-ply and over; off-the-road tires, casing and treads 6.50 by 19, 6.50 by 20 and 6.15 by 16 in six-ply and over; and 7.00 by 20, 7.50 by 20 and 9.00 by 28 in eight-ply and over; 16.00 by 20 in thirty-six-ply and over, and a series of industrial tires and casings, and high pressure rotary drill hose with capacity of 3,000 pounds per square inch and over.

The revised controls follow indications that the Soviet bloc has been able to make its own rubber goods, although tires captured in Korea indicate that Soviet quality does not meet U. S. "cold rubber" developments. Recently, licenses have been available on many rubber products and Commerce Department agents have been tracing shipments to their destination to guard against trans-shipment to the Soviets.

Exceptionally wide rubber squeegees designed to speed the cleaning of floors in stores, plants, etc., are being offered by the Daugherty Rubber Co., Cleveland, Ohio. The squeegee blades are molded from Hycar rubber.

Local Group Membership

John M. Ball (Midwest Rubber Reclaiming), vice-chairman of the Division of Rubber Chemistry, American Chemical Society, and chairman of the Liaison Committee, has reported on the approximate membership of the various rubber groups. The list follows: Los Angeles, 660; Northern California, 125; Chicago, 565; Fort Wayne, 310; Southern Ohio, 215; Detroit, 750; Akron, 1,690; Buffalo, 295; Washington, 290; Philadelphia, 420; New York, 775; Connecticut, 485, Rhode Island, 375, and Boston, 775.

3M Sues Thirteen Firms

Patent infringement suits naming thirteen concerns and six individuals have been filed by the Minnesota Mining & Manufacturing Co. of St. Paul, Minn., charging illegal manufacture and sales of its plastic electrical tape. The actions were begun early in August in three United States District Courts. The Minnesota company asks permanent injunctions to restrain the defendants from manufacturing and selling the product, an accounting to establish damages and payment of costs and attorneys' fees by the defendants.

The suits charge that the defendants infringed United States patent re-issue No. 23,843 covering the manufacture of Scotch brand electrical tape No. 33—described as a pressure-sensitive, stretchable and retractable plastic electric tape. Two suits filed on August 4 at Chicago, Ill., named the Technical Tape Corp., New York; Technical Tape of Illinois, Inc., Chicago, and Floyd R. Warner, an official of the concern; Levin Bros. Paper Co., Chicago; Plymouth Rubber Co., Canton, Mass.; Hawkins Electric Co., Chicago; Jerome J. Levitt, James J. Driscoll and Melvin R. Heckler, co-partners in the Complete Electrical Supply Co., Chicago, and F. M. Shumway-Fresen Co., Chicago.

A suit filed in St. Louis, Mo., named as defendant the Superior Insulating Tape Co., St. Louis. Two actions filed at Greensboro, N. C., named Sears, Roebuck & Co., New York corporation with an outlet in Greensboro; the Pine State Electrical Supply Co., Durham; Noland Co., Inc., Winston-Salem; Scott-Parish Electrical Supply Co., Raleigh, and the Dixie Radio Supply Co., of Charlotte, Inc.

Powell Joins General Latex

A. E. Powell, until recently associated with the Alco Oil & Chemical Co., has joined the staff of the General Latex & Chemical Corp., Cambridge, Mass., as a sales representative. Active in the rubber industry since 1930, Mr. Powell has been associated with the U. S. Rubber Co., the Flintkote Co., and Pioneer Latex & Chemical Co. During the early years of the synthetic rubber program, he worked for the Office of Rubber Reserve in Washington, D. C.

NSC RUBBER SECTION PLANNING INTERESTING OCTOBER MEETING

Safety men from the rubber industry who attend the 42nd National Safety Congress and Exposition in Chicago, Ill., on October 18-22, will get a close look at the outstanding multi-plant safety program of the Firestone Tire and Rubber Co. Glen D. Cross, director of safety for Firestone will moderate a discussion by four Firestone safety men. Speakers will be M. R. Batche, safety director, Xylos Rubber Division; A. E. Bernel, safety director, Firestone Steel Products Division; Frank C. Starbird, safety manager, Synthetic Rubber Division, and D. M. Cornell, assistant director of safety for Firestone. At the same session on Tuesday afternoon, October 19, N. C. Longee, safety supervisor, U. S. Rubber Co., Passaic, N. J., will tell of recent developments in calender safety.

On Wednesday afternoon, October 20, Grant E. Rose, Wooster Rubber Co., will tell what a new Rubber Section member expects from National Safety Council membership. Five round table discussions will make up the remainder of the afternoon program. Discussion topics and leaders are:

"Synthetic Rubber and Rubber Laboratories" by K. B. Davis, supervisor of safety and training, B. F. Goodrich Chemical Co., Cleveland, Ohio.

"Automatic Tire Press Safety" by Ed Turner, safety director, Goodyear Tire and Rubber Co. of Canada, Toronto.

"Handling of Heavy Tires" by George H. Burkhardt, safety and plant protection manager, General Tire and Rubber Co., Akron.

"Mechanical Rubber Goods Safety" by C. E. Beck, safety director, St. Clair Rubber Co., Marysville, Ohio.

"Safety in Reclaim Operations" by M. R. Batche, safety director, Xylos-Firestone, Akron.

Site of Rubber Sessions

The rubber sessions will be held in the LaSalle Hotel. The LaSalle is also scheduled for the chemical sessions which will run Monday through Friday of Congress week. Chemical sessions will feature demonstrations, exhibits and films on safety gadgets, static electricity hazards, bulk storage of flammable liquids and the new Chem-Proof air suit.

Sessions of general interest to all those attending the Congress will be presented by the American Society of Safety Engineers. Some of the topics to be covered in these morning meetings will be the safe handling of materials, industrial noise, accident costs, nuclear developments, civil defense, industrial solvent, better seeing and effective communications for improved safety.

The 1954 exposition with its 238 display booths will be the largest and most comprehensive display of accident prevention equipment to be seen anywhere. All exhibit space in the Conrad Hilton Hotel will be filled with products, equipment and services relating to the promotion of safety, health, first aid, sanitation, etc.

TRACERLAB ANNOUNCES SYMPOSIUM ON RADIOACTIVITY APPLICATIONS

The Technical Division of Tracerlab, Inc., Boston, Mass., is sponsoring a three-day symposium on the "Applications of Radio-activity in the Rubber and Plastic Industries" on October 6 through 8 at the Sheraton Plaza Hotel, Boston, Mass. The primary objective of the symposium will be to acquaint members of the plastics and rubber industries with the past uses, and possible future applications, of radioisotopes in research, development and process control.

The first day of the symposium will be devoted to orientation talks directed to those persons who are contemplating the use of radioisotopes. John W. Irvine, Jr., associate professor of nuclear chemistry at the Massachusetts Institute of Technology will be chairman of this session. W. E. Barbour, president of Tracerlab, will deliver the welcoming address. The day's activities will feature a cocktail hour and a banquet. Dr. George E. Manov of the Atomic Energy Commission, will be principal speaker at the banquet. Papers scheduled for presentation on the first day, October 6, include the following:

"The Role of the Atomic Energy Commission in the Industrial Use of Radioactivity" by P. C. Aebersold, director of the Isotopes Division, AEC, Oak Ridge, Tenn.

"Fundamentals of Radioactivity" by W. C. Peacock, technical director of Tracerlab, Inc.

"Health Physics Considerations" by C. R. Williams, director of Industrial Hygiene Services, Liberty Mutual Insurance Co., Boston, Mass.

"Instrumentation for Radioactivity Work" by F. H. Low, product manager, Tracerlab, Inc.

"Establishing a Radioisotope Laboratory" by Edward Shapiro, head of the Inorganic Chemistry Department, Tracerlab, Inc.

"Isotopes and Labeled Compounds" by Seymour Rothchild, head of the Organic Chemistry Department, Tracerlab, Inc.

Other Symposium Plans

The second and third days of the symposium will be taken up by the presentation of technical papers by speakers from industry, academic research institutions and the Atomic Energy Commission. These speakers will present papers and lead discussions on a wide variety of topics directly pertinent to the rubber and plastics fields. Hiram McCann, editor of *Modern Plastics*, will act as chairman on the second day of the symposium, October 7. Papers scheduled for presentation on that date, include:

"Gamma Radiation as an Initiator for Polymerization Reactions" by D. S. Ballantine, Fission Products Utilization Project, Brookhaven National Laboratory, Upton, L. I.

"Polymerization by Various Types of Radiation—A comparative Study" by Gerald Oster, associate professor of Polymer Chemistry, Polytechnic Institute of Brooklyn, Brooklyn, N. Y.

"A General Survey of Effects of Atomic Radiations on High Polymers" by K. H. Sun, Physics Department, Research Laboratories, Westinghouse Electric Corp., East Pittsburgh, Penna.

"The Kinetics of Vinyl Acetate Polymerization in Benzene" by L. H. Peebles, Jr., Chemstrand Corp., Decatur, Ala.

"The Application of Radioactive Tracer Techniques to Plastics Mold Erosion Study" by A. P. Landall, supervisor of technical service, Phenolic Products Engineering Section, General Electric Co., Pittsfield, Mass.

"Radioisotope Techniques Applied to Tread Wear Studies" by D. L. Loughborough and J. W. Born, Physical Research Laboratory, B. F. Goodrich Co. Research Center, Brecksville, Ohio.

"The Application of Radioactivity to the Studies of Solvation and Migration Rates of Plasticizers" by J. L. Kalinsky, Materials Laboratory, New York Naval Shipyard, Brooklyn, New York.

Jerome D. Luntz, editor of *Nucleonics*, will serve as chairman on the third day of the symposium, October 8. Papers scheduled for presentation on this date include:

"Tracer Measurements of Molecular Migration" by S. D. Gehman, head of the Physics Research Laboratory, Goodyear Tire & Rubber Co., Akron, Ohio.

"Penetration of Moisture into Attached Protective Coatings" by G. D. Calkins, Meyer Proberskin, V. E. Young and L. J. Norwacki, Battelle Memorial Institute, Columbus, Ohio.

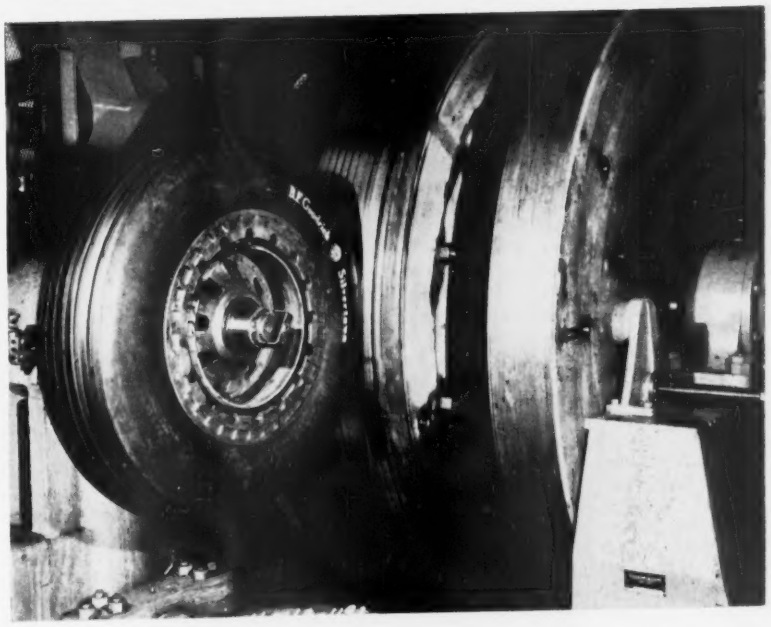
"Measurement of Liquid Level by Neutron Detection" by S. Barnartt and K. H. Sun, Physics Department, Research Laboratories, Westinghouse Electric Corp., East Pittsburgh, Penna.

"Beta Ray Excited X-Ray Sources for Thickness Gauging" by L. Reiffel, supervisor, Nuclear Physics Section, Armour Research Foundation, Chicago, Ill.

"Beta Gauging and Automatic Control" by E. T. DePass, project supervisor, Johnson & Johnson, New Brunswick, N. J.

"The Use of a Beta Gauge in Continuous Web Thickness Measurement" by N. S. Foster, Engineering Department, Congoleum-Nairn, Inc., Kearny, N. J.

GOODRICH INSTALLS HIGH SPEED AIRPLANE BRAKE TESTING MACHINE



What is said to be the highest speed airplane brake-testing machine used in industry is this new dynamometer recently installed at the wheel and brake plant of the B. F. Goodrich Co. at Troy, Ohio. The machine presently has a top speed of 246 miles an hour with provision for future speeds up to 300 miles an hour. A wheel loaded to 70,000 pounds and traveling at 246 miles an hour can be tested on the new dynamometer. Such tests simulate stresses sustained by wheels and brakes in landing and stopping safely today's giant planes where individual wheels must support loads up to 25 tons. The new machine will be the only dynamometer equipped with apparatus to duplicate the effects of windage and aerodynamic drag met in actual aircraft landings. The unit weighs 113 tons, and stands nine feet high. The 56 x 16 aeronautical tire shown above was traveling at 100 miles an hour when this picture was taken. Goodrich makes this tire, wheel and brake for use on the Boeing B-52 intercontinental bomber. The picture was taken with stroboscopic lights at 1/300,000th of a second, the company revealed.

"Extrusion Factors of Black Rubber Compounds" by Isaac Drogin, Hester R. Bishop and Paul Wiseman is the title of a reprint now available from the Research Department, United Carbon Co., Charleston, West Va. The article originally appeared in the February, 1954, issue of RUBBER AGE.

CONSOLIDATED CARBON FORMED; GETS LYNN-FURMATIC LICENSE

The Consolidated Carbon Corp. has been formed at 600 South Michigan Avenue, Chicago 5, Ill., and has acquired world rights to the Lynn-Furmatic process for the manufacture of carbon black from the Lynn Carbon Black Co. of San Angelo, Texas. Consolidated Carbon has contracted to build ten plants, mainly in foreign countries, for the production of carbon black using the Lynn-Furmatic process. The construction of a full-sized plant, probably in Coleman County, Texas, is also contemplated. Research and development activities will be centered in this plant.

Grinnell F. Oliver has been named president of Consolidated Carbon, while Joseph T. Plunkett and E. W. Hebestreet are vice-presidents. Under the terms of the licensing agreement, Consolidated Carbon will build all ten plants before the end of 1963 and pay Lynn Carbon Black $30,000 per plant for construction supervision. In addition, Consolidated Carbon will pay graduated royalties to the Lynn company that in 1963 would total $1,350,000, based on 1c a pound for all carbon black processed by the Furmatic method.

The Furmatic process came about some two years ago when Rice Lynn, a Texas attorney, came up with a new method for the manufacture of carbon black and called it the Lynn-Furmatic Process. It is said to be a new and unique method for the manufacture of black which embraces the best features of the channel, furnace and thermal process with none of their inherent drawbacks. It is said that due to its unusual and simplified design, in which the Lynn-Furmatic burner and multi-zoned furnace plays an important part, it is possible to make a channel-type black as well as the reinforcing and color blacks in the higher quality ranges.

Products to be Made

In general, two types of products will be made for any given run and these may be varied to meet market demands. However, in the two-unit type plant (5,000,000 CFD capacity), four different types of black may be made simultaneously. Operating entirely on natural gas or a mixture containing as much as 50% oil, the process produces a channel-type, furnace and catalytically cracked carbon black.

The type and the amount of carbon black recovered by the Lynn-Furmatic process is a function of the air-gas ratio and the temperature-pressure relationship, all of which is automatically controlled and may be varied as required.

The carbon black so produced is then air-cooled, along with products of combustion in a primary air cooler with atmospheric air running counter-current to the hot gases, from the furnace, thence through a hot gas fan into a series of cyclones, thence through a secondary air cooler and into an Orlon dust-tube collector, to intermediate storage for either pelletizing or fluffy carbon black sacking.

Elimination of water injection for cooling is an important improvement in the manufacture of carbon black. It is well known that the use of water for cooling changes the character of the carbon black to its detriment. The Lynn-Furmatic process uses air for cooling and, therefore, the quality of the Furmatic product is said to be greatly enhanced in compounding.

The channel-type black is made within the burner flame itself, a portion of which is lost by combustion, since the air-gas ratio may vary from 4 to 8 volumes of air per volume of gas processed. It follows that the furnace temperature may thereby be precisely controlled, leading to the formation of carbon black above the burners in the lower region of the furnace by dissociation, requiring a somewhat lower temperature than pure thermal cracking. Cracking occurs in the upper section of the furnace.

When a fuel is heated to some temperature under specified conditions, it spontaneously ignites and burns. Since the spontaneous ignition temperature is the minimum temperature of self-ignition, it follows that rates of oxidation increase with temperature. Oxidation reactions are highly exothermic, i.e., they give off heat to its surroundings and are commonly referred to as reactions or heats of reaction. By the same token, the heat of combustion is endothermic.

Since the combustion of hydrocarbons is primarily a chain reaction, it resolves that successive, competing, overlapping and opposing reactions occur simultaneously in the combustion process where, at the temperature of combustion, hydrocarbons rapidly dissociate into "free hydrocarbon radicals". However, through successions of the above active radicals, they are converted in CO_2 and H_2O with preliminary formations of aldehydes, the degree of combustion depending on the amount of oxygen supplied by means of air.

The actual thermal cracking occurs in the upper zone of the furnace, and contains a hood, which may be raised or lowered for optimum conditions and reaction time; this hood also acts as a catalyst for cracking the unburned gas into its components of hydrogen and oxygen with a further yield of black.

Considerably Greater Yields

This combination is conducive to yields considerable greater than present conventional processes. It, of course, obtains that the gas components with their carbon content determine the actual amount of carbon black that may be produced and recovered. The grade of carbon black required will, in a large measure, determine the amount of yield.

All carbon black manufacturing processes form a certain amount of calcined carbon or grit. This must be cleaned either by air or by the more commonly used means of a pulverizer, in order to improve the quality of the product. It is the latter method which is used in the Lynn-Furmatic process, but process air is also filtered before entering the furnace.

ESTIMATED CARBON BLACK RECOVERY PER CUBIC FEET OF A TYPICAL TEXAS NATURAL GAS

	Pounds of Carbon Black per 1000 Cubic Feet				
Type of Black	MT	SRF	HMF	RF	MPC
Conventional Plant	11.3	5.9	4.1	2.8	1.1
Lynn Pilot Plant	16.8	9.5	6.3	4.9	1.6

The accompanying table, prepared by the Lynn company, shows the carbon black recovery in pounds per 1000 cubic feet of a typical Texas natural gas. A number of conventional types of plant runs were averaged versus the Lynn pilot plant.

The average increased total yield of the Lynn process as indicated in the table, it is claimed, is in excess of 40 to 50%. It should also be remembered, the company states, that the Lynn yields are from a pilot plant operation, and that yields will probably be in excess of the figures quoted in a full-scale operation.

Lynn Carbon black declares that the Furmatic process represents one of the most outstanding improvements for the manufacture of carbon black evolved in many years. The operation of the plant is entirely automatic and smokeless, it is said. This is an important and desirable feature from an air-pollution standpoint.

Reappoints Liaison Committee

John M. Ball (Midwest Rubber Reclaiming), vice-chairman of the Division of Rubber Chemistry, American Chemical Society, and chairman of the Liaison Committee, has reappointed the previous members of the committee, all of whom kindly agreed to serve again for 1954. The composition of the 1954 Liaison Committee is as follows: R. E. Hutchinson (Firestone), representing Los Angeles and Northern California; Daniel Reahard, Jr. (General Tire), representing Chicago and Fort Wayne; Stewart L. Brams (Dayton Chemical Products Laboratories), representing Southern Ohio, Detroit, Akron and Buffalo; J. S. Jorczak (Thiokol Chemical), representing Washington, Philadelphia and New York; and Lyle L. Longworth (Monsanto Chemical), representing Connecticut, R. I. and Boston.

Expanding Research Facilities

Dow Chemical Co. is expanding facilities for latex research and development at its Midland, Michigan plant. The program includes building a 7,000 square-foot latex research laboratory scheduled for completion November 1. The laboratory will concentrate on improving present Dow latices and developing new latices for use in the paint and paper coatings fields and other industries. Two other buildings, due to be completed in early 1955 and comprising 7,200 square feet, will also be devoted to latex development.

GOODYEAR STRIKE SETTLEMENT SETS BASIC INDUSTRY PATTERN

Goodyear Tire & Rubber Co. and the United Rubber Workers, C.I.O., signed an agreement on August 27 calling for wage increases averaging 6½c an hour, thus bringing to an end the 51-day strike which had idled employees in ten plants. Settlement of the Goodyear strike provided for immediate hourly wage increases of 10c for 1,200 employees at Topeka, Kans.; 8c an hour for 2,500 employees at Gadsden, Ala., and 6c an hour for employees at eight other plants.

The union had originally asked for a package increase of 12¾c an hour including a 7½c wage increase and 5¼c an hour to correct inter- and intra-plant differentials. Prior to the strike, Goodyear offered the U.R.W. 5c an hour.

Settlement of the Goodyear strike established a pattern which was followed in the signing of a contract by the B. F. Goodrich Co. on August 28. Some 15,000 Goodrich employees in nine cities were granted an average hourly increase of 6½c, retroactive to August 23. Although employees had voted strike call power to the union, they had remained on the job on a day-to-day basis after their contract expired on July 26.

The dispute between the U. S. Rubber Co. and the U.R.W. was settled on August 31, following the basic terms of the settlement established in the Goodyear contract. At U. S. Rubber, however, there was no differential between plants. All employees received the same increase, retroactive to August 23, and subject to ratification by union locals.

Firestone Strike Ends

A 24-day strike by employees of the Firestone Tire & Rubber Co. ended on September 4, when the company fell in line with the pay increase pattern in the industry, granting pay increases averaging 6½c an hour. The strike began on August 12, following eight weeks of negotiations. The union contract with Firestone had ended on August 10.

A settlement under similar conditions was also signed with the U.R.W. by the General Tire & Rubber Co. The General Tire agreement affects 1,800 employees in Akron and 900 in Waco, Texas. The boost increases the pay average for the Akron employees to $2.32½ an hour and $2.05 for Waco employees.

In other agreements, contracts have been signed by the U.R.W. and the Baldwin Rubber Co., Pontiac, Mich., Richardson Co., Melrose Park, Ill., the Seiberling Rubber Co., Akron, Ohio, and the Mohawk Tire & Rubber Co., Akron, Ohio. Some 1,000 employees at Baldwin Rubber received an average wage increase of 6½c an hour. The same terms applied to approximately 2,500 persons employed at five Richardson plants, 1,700 Seiberling employees, and 500 employees at Mohawk.

Quaker Rubber Co., Philadelphia, Penna., and the U.R.W., in a settlement of their differences, agreed to a basic 5c an hour increase and other benefits for employees. Total hospital allowances, daily hospital benefits, surgical benefits and pensions were increased up to 100%. A new contract was also signed on August 10 at the Armstrong Cork Co., Lancaster, Penna. Approximately 4,200 plant employees received a 5c an hour wage increase and a provision was provided for three paid days off for a death in the immediate family.

The contract also calls for paid time for jury duty with the company paying the difference between jury pay and the employees normal rate of pay. A joint labor-management committee was set up to study seniority provisions of the contract. While the old contract was scheduled to run until November 1, both sides agreed to discuss the contract when the union asked for a re-opening of the wage question.

A three-day walkout at the O'Sullivan Rubber Corp., Winchester, Va., ended on August 5 when 300 production workers, about 90% of the total work force, returned to work. The employees, members of Rubber Workers Local 22770, A.F.L., had gone on strike when certain employees were fired. Sympathy for the Goodyear strike was not a motive in the O'Sullivan strike, the union said.

Skyhook Soars 22 Miles

A giant plastic balloon, which before inflation stretched almost the length of a football field and covered three acres, was recently released over Kenyon, Minn., where it soared to a record height of 117,000 feet, or more than 22 miles, into the sky. When inflated, the "Super Skyhook" balloon is nearly as tall as an 18-story office building and measures 200 feet in diameter. The balloon was made for the Office of Naval Research by General Mills, Inc., and carried a cargo of scientific instruments to record conditions in the upper atmosphere. Made of transparent polyethylene film, about half the thickness of a human hair, the Super Skyhook is the largest of approximately 1,200 plastic balloons launched since 1947. The previous altitude record for a plastic balloon was 111,000 feet, a little more than 21 miles, reached two years ago by a smaller balloon.

Rubber Softener in Tank Cars

Methylbenzyl ether, a softener and tackifying agent for nitrile rubber, is now available in tank car quantities from the Carbide & Carbon Chemicals Co., New York, N. Y. The chemical structure of methylbenzyl ether (bis-alpha-methyl-benzyl-ether) indicates high solvent power for synthetic resins at elevated temperatures and its possible use as a plasticizer or plasticizer extender, the company states.

Coming in the October issue of RUBBER AGE—the first in a series on the European rubber industry!

A.S.M.E. AND S.P.E. SPONSOR INTERESTING LECTURE SERIES

The Metropolitan Section of the American Society of Mechanical Engineers, in cooperation with the Newark, N. J., and New York Section of the Society of Plastics Engineers, is sponsoring a series of lectures beginning on Monday, September 20 at the Engineers' Club in New York City for the purpose of enlightening engineers as to the specific engineering problems involved in rubber and plastics. The lectures will be held on succeeding Mondays through November 15.

On September 20, two papers will be presented. The first, entitled "Plastics Industry" will be given by Hiram McCann, editor of *Modern Plastics*, while the second, entitled "The Organic Plastics", will be delivered by Henry M. Richardson (DeBell & Richardson).

The meeting on September 27 will also feature two papers. Professor A. J. Monack (Newark College of Engineering) will speak on "Ceramic Products", and Leon R. Egg (Garfield Mfg.) will speak on "The Cold Mold Plastics".

Three papers will be presented at the next session on October 4. D. E. Jones (American Hard Rubber) will speak on "Natural and Synthetic Rubber Products"; Alex E. Javitz, special features editor of *Electrical Manufacturing*, will speak on "Silicone Rubber", and J. K. Honish (Bakelite) will deliver a paper on "The Elastomers and Non-Rigid Plastics".

On October 11, Dr. M. Wismer (Ciba) will speak on "Cast Plastics" and J. E. Niemeth (Insulating Fabricators) will deliver a paper on "Fabricated Parts".

S. E. Tinkham (Boonton Molding) will deliver one of two papers on October 18, this one entitled "The Thermoplastic Plastics". The other paper entitled "Thermoplastic Products" will be presented by John LaBelle (Foster Grant).

November Sessions Planned

On November 1, Isaac Kinsey (Owens Corning Fiberglas) will speak on "The Reinforced Plastics", and George Pickering (Plax) will speak on "Extrusion Plastics and Blownware".

The session on November 8 will feature a paper on "Appearance Design to Prototype" by Edward Ferrari (G-E), and another on "Material Selection Considerations" by J. H. DuBois (Mycalex).

The last session on November 15 will feature a "Review Forum and Exhibit". All speakers will be present for a round table discussion to integrate previous sessions and to answer questions resulting from the entire program. The Newark and New York Sections of SPE will provide an exhibit of plastics products for this meeting.

Further information may be obtained from J. H. DuBois of the Mycalex Corporation of America, Clifton, N. J. Mr. DuBois is serving as general chairman for the series of lectures.

A two cent a pound reduction in the price of technical pentaerythritol, retroactive to June 1, was recently announced by the Hercules Powder Co.

TECHNICAL PROBLEMS IN RUBBER NOW CONFRONTING THE ARMED SERVICES

Enlisting the aid of industry, science and the individual inventor in this country's defense effort, the U. S. Department of Commerce, on August 12, announced publication of a list of 200 technical problems confronting the armed services. Entitled "Technical Problems Affecting National Defense," the new publication was compiled by the Department of Commerce's National Inventors Council with the aid of the three military services.

The National Inventors Council was founded in 1940 to serve in the Department of Commerce as a clearinghouse for ideas, suggestions, inventions, and developments that might be useful to the armed services in the war effort. From over 300,000 proposals examined by the Council, thousands have been referred to military agencies. Many of these proposals have resulted in incalculable savings.

The list announced on August 12 contains some 70 new problems, along with about 130 carried over from previous lists. It is designed to direct the attention of inventors, scientists, engineers, technicians and research groups to specific problems facing the military, as well as more general problem areas where technological advances are desirable.

Solutions to these problems, or ideas that might lead to solutions, may be submitted to the National Inventors Council where they will be examined and evaluated. Those which show promise will, on Council recommendation, receive further study or investigation from appropriate military groups. Problems of particular interest to the rubber industry follow:

Radio-Proof Blasting Cap: An inexpensive and efficient electric blasting cap which cannot be initiated by electromagnetic radio or radar waves.

Semi-Conductor Material: Develop a semi-conductor material suitable for use in transistors, the color of which is to depend upon its conductivity type, that is, N type material one color, P type material a different color.

High Temperature Molding Compound: Molding compound having resistance to high temperatures (200°C.), low dielectric loss, and good mechanical properties. The material will be a plastic, preferably thermosetting, with good dimensional stability, and a short molding cycle.

Improved Elastomers: Development of improved elastomers to provide greater resistance to abrasion and increased resistance to cutting and chipping for use in tank track blocks.

Metal to Metal Adhesive: Increasing operating temperatures up to 500° F. requires a metal to metal adhesive having a shear strength of at least 2500 psi for aeronautical structural applications. Such an adhesive should suffer little or no loss of strength after exposure of one hour or more at 500°F. and should be capable of being applied without extremely precise control of processing variables.

Design of Cold Weather Field Sleeping Gear: An item which will permit sleeping men to change position (turn over, etc.) without awakening and which will prevent the sleeper from breathing into the bag to obviate the accumulation in the insulating material of condensed moisture from exhaled breath. The device should be adaptable to field laundering preferably through the employment of a removable lining and case.

Plastic Material: A hard plastic material that is compatible with all organic and inorganic explosive materials at all temperatures from —65°F. to +165°F., and under all conditions of relative humidity.

Pneumatic Tire Substitute: Sponge rubber suitable for zero pressure tires (eliminate the flat which occurs when vehicle stands).

Substitute for Neoprene: A substitute for neoprene that will not get brittle at temperature —70°F., yet be oil resistant.

Corrosion Resistant Compound: The development of an easily applied corrosion resistant compound that will remain on metal throughout a temperature range of —80°F. to +200°F. and will prevent all corrosion.

Development of Sandwich Core Materials: A core material is needed for aircraft structural sandwich construction which will—(a) Be light in weight—not over 10 lbs./cu. ft.; (b) Not be affected by moisture to an appreciable degree—will not soak up moisture; (c) Have tensile strength of at least 1000 psi.; (d) Resist deterioration under high humidity; (e) Retain characteristics at temperatures up to 600°F.; (f) Not induce corrosion in combination with aluminum, magnesium and stainless steel; (g) Be capable of manufacture and fabrication at low and reasonable cost; (h) Be manufactured from materials available in quantity in the USA.

Light Weight Expendable Pallet (Revised): The Armed Services have a requirement for a light weight expendable pallet having the following characteristics: (1) Approximately 40" x 48" in size; (2) Provide for entry of lift forks from each of the four faces; (3) Be constructed of non-metallic waterproof materials; (4) Be capable of withstanding a minimum load of 1500 pounds per pallet and, when stacked four high in warehousing, a load of 7500 pounds on the bottom pallet; (5) Be capable of withstanding an average minimum of 16 handlings; (6) Constructed in such fashion that the bottom face will not damage the top layer of packages on the loaded pallet directly below in a stack; (7) Be capable of withstanding temperatures of from 125°F. to minus 65°F. under operating conditions, temperatures up to 160°F. for a period of four hours and minimum low temperatures of minus 80°F. in storage; (8) Preferably have a weight less than the 75 to 100 lbs. for wood pallets and cost materially less than the approximately $1.75 cost of wood pallets.

Adhesive Tape, Industrial: To develop a pressure adhesive tape having the following characteristics: (1) Inexpensive and not composed of strategic or critical materials; (2) Capable of application without use of heat in temperatures as low as —40°F.; (3) Desirable, although not mandatory, that the tape be suitable also for use in temperatures to +125°F.; (4) Must be capable of withstanding weather conditions for at least one year without peeling; (5) Capable of storage in temperatures from —80°F. to +160°F. without serious deterioration; and (6) Capable of adhering to various materials. This is for use in sealing panel joints on prefabricated buildings.

Material for Arctic Gloves Resistant to Deterioration by Oil and Gasoline.

Rubber Formulations and Other Materials (Revised): The problem is to develop rubber or rubber-like materials which will maintain their functional properties over the temperature range of —65°F. to 160°F. Silicone compounds with high tensile strength and elongation are available as a result of research studies during the past few years. Considerable research has been done on butadiene type polymers and several satisfactory elastomers have been developed for general purpose use. Oil-resistant polymers present an unusually difficult problem in that, in general, the polarity of the molecule, necessary for oil resistance, contributes to poor low temperature resistance. The fields of fluorocarbons, polysulfides, etc., are under investigation to develop fuel and chemical resistant Arctic rubbers.

Waterproof Case Liner for Clothing: Development of waterproof case liner for clothing which will withstand rough-handling and exposure to temperatures ranging from —80°F. to 160°F. and R. H. of 30 percent to 95 percent. The performance standards of existing commercial water-resistant barrier materials are limited; for example, in some instances, the water-resistant barrier materials have been developed to withstand temperatures up to 170° without bleeding, blocking, or separation of the laminated plies of materials. However, at —20°F. they failed, due to non-flexibility. On the other hand, materials fabricated with laminates which remain flexible at —20°F. or below have failed to perform in accordance with the standards required, due to bleeding, blocking, or separation of laminated plies at +100°F. and above. The required water-resistant case liner for clothing, in addition to meeting the above requirements, should withstand rough handling. If no case liners at all are used, exposure damage and water absorption will result. New type of materials have been submitted as possible solutions to this problem; some of these show definitely desirable qualities.

Closing Detroit Factory

National Automotive Fibres, Inc., has announced plans to permanently close its manufacturing facilities in Detroit, Mich., sometime in September, 1954. The plant's production will be tranferred to other company facilities, a spokesman said. Almost 100 hourly workers will be affected by the closedown. The plant will be closed to enable the company to reduce costs by consolidating operations, the spokesman said. The 350,000-square-foot Detroit plant turns out auto panels and carpeting. Panel operations will be switched to the firm's Findlay, Ohio, plant. The company did not indicate where the production of auto carpets would be carried on.

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PHILADELPHIA GROUP HOLDS TENTH ANNUAL GOLF OUTING

The Tenth Annual Golf Outing of the Philadelphia Rubber Group was held on August 20th at the Cedarbrook Country Club, Philadelphia, Penna. Approximately 130 members and guests participated in the golf tournament. The day's events included a cocktail hour which was followed by a dinner attended by some 240 members and guests. Door prizes were drawn after dinner.

Tom Loser (Wyrough & Loser) served as Golf Chairman for the outing. The Prize Committee consisted of A. L. Shaw (Goodrich) and Tom Elks (R. T. Vanderbilt). Dr. M. A. Youker (Du Pont) served as Outing Chairman. Contributions for prizes were solicited by L. E. White (Walker Bros.).

The following members and guests won prizes for the various golf events:

Low Gross (members)—E. B. Osborne (Goodrich Chemical), W. B. Curtis (Naugatuck Chemical), Joseph Breckley (Titanium Pigments), and R. H. Crossley (St. Joseph Lead); *Low Gross (guests)*—F. H. Fritz (DuPont), A. A. Kerr (John A. Roebling's Sons) and B. C. Baeringer.

Calloway System (net)—John Baymiller (Armstrong Cork), C. B. Hall (Thermoid), Tom Loser and Hobart G. Suppers (John A. Roebling's Sons); *Most 3's*—R. N. Hendricksen (Phillips Chemical); *Most 7's*, R. Forbes (Gates Engineering); *Closest to Pin*—M. A. Smook (DuPont).

A. J. DiMaggio (Firestone), chairman of the group, speaking at dinner, announced plans for the First Annual Dance which will be held on October 15 at the Manufacturers Country Club, Oreland, Penna. Mr. DiMaggio also announced that a questionnaire regarding the inception of a basic rubber technology course will shortly be circulated to the membership. It was also announced that the next technical meeting will be held on November 12 at the Poor Richard Club in Philadelphia. The meeting will consist of a panel discussion on extrusion. Alvin Gray (Western Electric) and Arthur Nellen (Lee Rubber) will participate in the panel discussion.

Vaughn Promotes Executives

Vaughn Machinery Co., Cuyahoga Falls, Ohio, has announced the promotion of four top executives. L. A. Vaughn, president since 1929, has been made chairman of the board. Succeeding him as president and general manager is his son, James A. Vaughn, who has been with the company since his graduation from Cornell University in 1938. Gordon C. Vaughn, who joined the company in 1947 after service as both a military and commercial pilot, was elected vice-president in charge of manufacturing. E. J. McIlvried was made senior vice-president and director of engineering. He has been with the company since 1925, starting as chief engineer and later became a vice-president and director. Allan Vaughn continues as secretary and Eugene Daugherty as vice-president in charge of sales.

Coming Events in the Rubber Industry

Sept. 23. Southern Ohio Rubber Group, Fall Technical Meeting, Engineer's Club, Dayton, Ohio.

Sept. 25. Connecticut Rubber Group, Annual Outing, Grassy Hill Park, Sodom Lane, Derby, Conn.

Sept. 30. Fort Wayne Rubber & Plastics Group, Hotel Van Orman, Fort Wayne, Ind.

Oct. 5. Buffalo Rubber Group, Westbrook Hotel, Buffalo, N. Y.

Oct. 5. Los Angeles Rubber Group, Statler Hotel, Los Angeles, Calif.

Oct. 8. Detroit Rubber & Plastics Group, Detroit-Leland Hotel, Detroit, Mich.

Oct. 14. Northern California Rubber Group.

Oct. 15. Philadelphia Rubber Group, Annual Dance, Manufacturers Country Club, Oreland, Penna.

Oct. 15. Boston Rubber Group, Fall Meeting, Hotel Somerset, Boston, Mass.

Oct. 22. Akron Rubber Group, Joint Meeting with the Society of Plastics Engineers, Mayflower Hotel, Akron, Ohio.

Oct. 22. New York Rubber Group, Fall Meeting, Henry Hudson Hotel, New York, N. Y.

Nov. 3. Los Angeles Rubber Group, Statler Hotel, Los Angeles, Calif.

Nov. 11. Northern California Rubber Group.

Nov. 12. Philadelphia Rubber Group, Dinner Meeting, Poor Richard Club, Philadelphia, Penna.

Nov. 17. Washington Rubber Group.

Nov. 18. Rhode Island Rubber Club, Fall Meeting, Metacomet Golf Club, East Providence, R. I.

Dec. 2. Fort Wayne Rubber and Plastics Group.

Dec. 3. Los Angeles Rubber Group, Xmas Party, Ambassador Hotel, Los Angeles, Calif.

Dec. 8. Buffalo Rubber Group, Xmas Party, Buffalo Trap and Field Club, Williamsville, N. Y.

Dec. 9. Northern California Rubber Group.

Dec. 10. Boston Rubber Group, Xmas Party, Hotel Somerset, Boston, Mass.

Dec. 10. Detroit Rubber & Plastics Group, Xmas Party, Sheraton Cadillac Hotel, Detroit, Mich.

Dec. 10. New York Rubber Group, Xmas Party, Henry Hudson Hotel, New York, N. Y.

Dec. 17. Chicago Rubber Group, Xmas Party, Morrison Hotel, Chicago, Ill.

Dec. 18. Southern Ohio Rubber Group, Xmas Party.

Rubber Packaging Experiments

The Office of Synthetic Rubber of the Federal Facilities Corporation and the Firestone Tire & Rubber Co. are currently conducting experiments to determine whether an experimental cardboard box is a better container for synthetic rubber than the heavy paper bags generally used. A major problem in the rubber industry has been the packaging of synthetic rubber so that it will store for a long period of time without losing shape, will not adhere to the inside of the container, and can be unpackaged efficiently and economically. Experimental work with the new packaging was started in Firestone's Los Angeles plant. Last January, 80,000 pounds of synthetic rubber, cut into 75-pound oblong blocks, were placed in the experimental containers and shipped by rail from the FFC synthetic rubber plant at Torrance, Calif., to Akron. Here, they were placed in storage and only recently removed for examination. E. D. Kelly, director of the Office of Synthetic Rubber, stated that on the basis of what had been observed, the new container shows great promise.

Buys Hydraulic Press Assets

A group headed by Frederick W. Richmond of New York, in a third major move in recent weeks, has agreed to buy the assets and name of the Hydraulic Press Manufacturing Co. of Mt. Gilead, Ohio, for approximately $4,300,000. The sale must be approved by stockholders. Mr. Richmond is chairman of four machine tool companies. Recently, stockholders of the Birdsboro Steel Foundry & Machine Co., Birdsboro, Penna., approved the sale of their company to the group headed by Mr. Richmond for $3,900,000. Birdsboro produces steel castings, metal specialties, and industrial equipment. In early August, Mr. Richmond and associates agreed to buy the assets of the Follansbee Steel Corp. of Pittsburgh, Penna., for $9,000,000. This sale must also be approved by stockholders. The corporate shell of Follansbee would be merged with a buildings material firm and a chemical firm controlled by Clint W. Murchison of Dallas, Texas. The business of Hydraulic Press will be continued under the same name and there will be no change in politics or management personnel.

AMERICAN COLLO CORP. FORMED FOR PRODUCTION OF POLYURETHANE FOAMS

American Collo Corp. has been formed at 79 Wall Street, New York 5, N. Y., for the development and application of all types of polyurethane materials. The company is an affiliate of Collo Rheincollodium, Cologne, Germany, and will operate in the United States with the cooperation of the Mobay Chemical Co. Mobay was formed earlier this year by the Monsanto Chemical Co. and Farbenfabriken, Bayer, Leverkusen, Germany. American Collo states that it will operate under a license granted by Mobay in the production of polyurethane foams.

Rolf Morom, who heads Collo Rheincollodium, is vice-president of American Collo, while Otto Seligmann is president. Joseph Winkler, chief chemist, has applied for U. S. patents which he has assigned to the American concern. Collo-Germany is already producing a great variety of bath and household sponges, bristleless brushes, hand cleaners, foams for industry and technical uses. American Collo expects to make similar products in a plant at Palisades Park, N. J., which it hopes to have in operation shortly. The plant will operate with German equipment and will be run by German technicians.

Material Named "Allfoam"

The polyurethane foam which American Collo will produce is called "Allfoam", and is said to be the result of about seven years of effort on the part of the parent German company. The work of Collo in Germany started in 1950 when the famous German chemical works of Bayer Leverkusen (formerly I. G. Farben A.-G.) started to manufacture the raw material necessary for the production of a diversified line of polyurethane foams, from very soft to rigid, for household and industrial uses.

It is stated that Collo Allfoam can be produced by American Collo with volume densities from 30 kilos per m^3 to 120 kilos per m^3 and more; having an open or closed cell structure, having cell diameters from 0.02 to 1.0 mm; from very soft and elastic structures to slow rebouncing rigid ones; from an almost transparent light reflecting and refracting material to an opaque one, Collo Allfoam can be made in any color or shape, it is claimed. Special grades of Collo Allfoam can be made for purposes that require exceptional hard wear and abrasive resistance. Collo Allfoam can also withstand boiling water, alkalis, soaps and detergents, as well as dry cleaning solvents.

Collo Allfoam is the general designation of a family of gas-expanded polyurethane foam plastics. Technically it is a thermoset cellular plastic material, obtained through the reaction of diisocyanates and polyesters in the presence of suitable activators that at times contain reinforcing materials. Generally speaking, the following basic reactions take place during the manufacturing process:

The polyester containing free hydroxide and carboxyl groups reacts with the diisocyanate forming a multiple of connecting bridges, consisting of the characteristic polyurethane and carboxylamid group: (—CO•O•NH—) and (—CO•NH—), whereby gaseous carbondioxide (CO_2) is freed as a result of the reaction between the free carboxyl group with the isocyanate group, forming the desired cellular structure of the finished material. The reaction is, however, quite complex and the resulting foam is dependent upon the grade of the diisocyanate, the type of polyester, the type of activators, and the construction of the foaming machine. The quality of the finished material is also greatly influenced by mixing temperature, mixing time, humidity and by manual efficiency of the operator.

It is emphasized that Collo Allfoam is not foam or sponge-rubber, nor is it chemically related to vinyl or cellulose materials. Collo Allfoam is a pure synthetic, which for the first time is said to combine highly valuable properties in one cellular material.

American Collo states that Allfoam is lightweight with the volume density in most grades 1/20th water, or less than 2 pounds per cubic foot. The material is flexible and elastic, durable, mildew and chemical resistant, the company claims. Collo Allfoam is resistant to wet heat up to 212°F. and dry heat up to 300°F. The material can be sterilized in boiling water, wet steam or dry air.

When freshly manufactured or sliced, All foam has a faint odor from a volatile component of the activator, but this is not inherent to the foam, and disappears when exposed to air for a short period of time or after being immersed in water and dried.

The material is also said to have exceptional thermal insulation power. Its "K" factor is about .033 kilos cal $M^{-1}/h\text{-}1°C.$ or twice as good as that of cork. The material is also sound absorbant and flame resistant, has low moisture absorbancy is non-friable and has excellent electrical properties, the company claims.

American Collo states that the material lends itself to use in upholstery, in medical applications, in padding, for protective packaging, for sound-proofing, for thermal insulation, and in many household and industrial uses.

Available in Various Sizes

Collo Allfoam is available in standard size blocks of 40 by 80 by 6 inches and in larger sizes on request. It is also available in any thickness from 6 to 5/64 inches, in prism-shapes of any desired dimension, any 3-dimensional curved shape, any diecut configuration, any large molded form, or in single or double laminates with fabrics, plastics, metallic foils, paper, wool, leather, etc.

The accompanying photograph shows some of the products currently being marketed by American Collo. In the upper left will be seen "Collo Quissel", a new dishmop made of Allfoam. On the upper right is a typical Collo sponge that is said to be permanently soft whether wet or dry and cannot be damaged by soaps, oils, detergents, laundry bleaches, alkali, gasoline or even mild acids. "Atomcollo", on the lower left, is a rigid foam material that is used with water to clean hard-to-clean hands. Since it contains no abrasive material, it cannot scratch or damage the skin. On the lower right is "Collo Brossa", described as the world's first bristleless clothes brush.

Shown above are a few of the typical household items made of "Allfoam" which are being marketed in the United States by the American Collo Corp.

General Tire Names Sales Agent

General Tire & Rubber Co., Akron, Ohio, has announced the appointment of Southern Latex Corp., of Austell, Ga., as southern sales agent for Gen-Tac latex, the company's special cord dip latex. Southern Latex will handle sales of the product in Georgia, Florida, Alabama, Mississippi, Tennessee, and North and South Carolina.

Walton Joins Bellofram Corp.

James C. Walton

James C. Walton, who recently resigned as assistant general manager and director of manufacturing for the Boston Woven Hose & Rubber Co., has joined the Bellofram Corp. of Waltham, Mass., as a director and vice-president in charge of production. Bellofram manufactures friction free seals and diaphragms from the new synthetic fabrics and elastomerics. From a rich background in rubber research, development, chemistry and production, Mr. Walton brings a wealth of experience to the new corporation. He secured his B. S. degree in chemical engineering from the Massachusetts Institute of Technology in 1923 and did further graduate study in colloid chemistry with Dr. E. A. Hauser there in 1928. With Boston Woven Hose since 1923, he has worked in research and development, and has been technical superintendent, general superintendent, assistant factory manager, assistant general manager and factory manager. Long active in the American Chemical Society, he is currently chairman of the Division of Rubber Chemistry. The Bellofram Corp. bases its manufacturing activities on a new concept of the bellows and diaphragm functions. The company manufactures "Belloframs", which are actually long-stroke, deep-convolution, constant area diaphragms used to transmit or control power in fluid systems. Applications range from vehicular braking equipment to pressure regulation in processing plants. The company reports that the new device is already finding wide usage throughout industry.

Discontinues Tube Production

Production of tubes in its Eau Claire, Wisc., tire plant will be discontinued effective September 1, the U. S. Rubber Co. announced on August 11. The action is part of an over-all plan prompted by the "increasing popularity and production of tubeless tires," Frank A. Cobb, Eau Claire factory manager, explained. About 250 of the plant's total working force of 3,450 will be affected. Mr. Cobb said, however, that about 200 of them have been with the company for more than five years and will be absorbed, under seniority rules, into other departments.

New York Holds Golf Outing

Despite a drenching rain that lasted until mid-morning, a record number of members and guests attended the Annual Golf Outing held on August 3 at the Baltusrol Golf Club in Springfield, N. J. Baltusrol was the site of the 1954 National Open. Total attendance at the outing was 275 with about 215 playing. The unexpectedly large turnout exceeded the capacity of the Club's dining room, but the Golf Committee, headed by Jerry Provost (U. S. Rubber), arranged to seat about 60 at a nearby, well-known restaurant. Other members of the Golf Committee included: A. H. Woodward (DuPont), G. N. McNamara (Pequanoc Rubber) and B. A. Wilkes (Cabot). In the golf tournament, Vincent J. Lake (Pioneer Latex) took the Nesbit Cup with a low gross of 77. E. B. Curtis (R. T. Vanderbilt), 1953 Cup Winner, and Jean H. Nesbit (U. S. Rubber Reclaiming), doner of the Cup, presented the trophy to the winner. Fil Salamon (F. F. Salamon) took second low gross for members with a 78, while third low gross was shared by four members: W. B. Curtis (Naugatuck Chemical); H. F. Jones, Jr. (H. Frank Jones), H. P. Pryor (R. E. Carroll) and A. W. Hubbard (Standard Oil Development). The putting contest was won by Ed Tyne (Irvington Varnish) with a 34. There were 17 tied for the kickers' handicap with scores of 76. Prize winning guests were: Jack Karnes, 78; E. J. O'Brien (DuPont), 79, and Louis Sadick (Ross & Roberts), 80. Len Komar (Titanium Pigment), a member of the group, was adjudged most honest when he admitted to a score of 155.

CCDA Plans October Meeting

The dramatic resurgence of the foreign chemical industry will be discussed at a meeting of the Commercial Chemical Development Association on October 7 and 8 at the Bedford Springs Hotel, Bedford, Penna. Six papers analyzing specific phases of international commercial development will be presented on the first day of the meeting, while the second day will be given over to a panel discussion of case studies. It is emphasized that the meeting will not concern itself with the physical exports and imports of goods, or with tarrifs. Instead it will study the transfer of technological know-how as a means of commercializing new developments in international markets. Further information on the meeting may be obtained from W. T. Hack, chairman of the Public Relations Committee, Commercial Chemical Development Association, c/o Ethyl Corp., 100 Park Avenue, New York 17, N. Y.

Gates Expansion Program

Gates Rubber Co., Denver, Colo., has announced a $1,000,000 outlay for construction of a new warehouse and manufacturing building next to its present raw materials warehouse in Denver. The two-story concrete structure will add 216,000 square feet of floor space. H. G. Naylor, chief plant engineer, said contracts will be let in September, with the completion date for the building set for April 1, 1955.

Named European Representative

Harry J. Collyer

Godfrey L. Cabot, Inc., Boston, has announced the appointment of Harry J. Collyer as technical representative for Continental Europe and the British Isles. On September 1, Mr. Collyer transferred his headquarters from Boston to the offices of Cabot Carbon Limited, at Stanlow, near Chester, England. Graduated from Tufts College in June, 1937, Mr. Collyer received the degree of B. S. in chemical engineering from the School of Engineering. He then joined the research and development staff of the Colgate-Palmolive-Peet Co. From 1942 he served as research assistant in the Division of Industrial Cooperation at the Massachusetts Institute of Technology, Cambridge, Mass., working particularly with the development of synthetic rubbers, and specifically, the reclaiming process. Mr. Collyer joined the Cabot organization in January, 1946. After extensive experience in rubber and plastics testing and in technical and sales service work, in January, 1950, he was appointed technical manager of Cabot Carbon Ltd., Cabot British subsidiary. He was also in charge of technical service. In July, 1952, he returned to Boston as Manager of technical service, a position which he held until the present time.

Rio Rubber Plant Opens

General Tire and Rubber Co. has started operations at its multi-million dollar tire and tube plant in the outskirts of Rio de Janeiro, Brazil. The company's third plant in South America, it contains 150,000 square feet of floor space. Other plants are at Caracas, Venezuela, and Maipu, Chile. H. W. Purviance, who has been stationed in Rio de Janeiro since ground was broken last year, is manager. General Tire also has plants in Toronto and Welland in Canada; Mexico City; Lousada, Portugal; Tel Aviv, Israel; Torrelavega, Spain; Port Elizabeth, South Africa; Zurich, Switzerland; and Turin, Italy. One plant is being built in Amsterdam, Holland.

RTA CITES MARKETING PROBLEMS INVOLVED IN SALE OF SYNTHETIC PLANTS

The Rubber Trade Association of New York, in a recent letter to bidders for the government's synthetic rubber facilities, expressed the view that the expected sale of the government owned synthetic rubber facilities to private enterprise will create a marketing problem. The consideration of this problem, RTA stated, cannot be unduly delayed, as it involves the proper distribution and servicing of synthetic rubbers on an equitable basis, with special emphasis on the requirements of the small consumer. While the transfer of plant ownership is both desirable and constructive, RTA declared, it is also essential that the effect thereof upon normal rubber marketing operations and the requirements of consumers be minimized to the greatest extent possible.

The RTA letter went on to state that under government operation, all synthetic rubber has been either sold direct to consumers by Reconstruction Finance Corporation or to dealer members of RTA acting as agents for consumers. With the transfer of the synthetic plants to private ownership, however, there is the possibility that in lieu of a single selling agency, 15 different sources of supply may come into being.

Although admittedly there is little likelihood that this extreme situation will develop, it is certain that synthetic rubber will be marketed through a number of different sources, as contrasted with a single sales agency, RTA opined. While this situation may not present any serious difficulty to a manufacturer or a group of manufacturers who become plant owners, it will definitely pose a problem for the hundreds of manufacturers who are not participants in the operation of a synthetic plant, with particular emphasis on the group whose consumption requirements fall in the category of less than carload lots.

Small Manufacturers' Position

In enacting the Rubber Plant Facilities Disposal Act of 1953, the Congress fully recognized the seriousness of the position of the small manufacturer who will not have an interest in the operation of a synthetic plant, and incorporated the following disposal criteria in the Act: "That the disposal program be designed best to afford small business enterprises and users, other than the purchaser of a facility, the opportunity to obtain a fair share of the end products of the facilities sold and at fair prices." This problem has also been fully recognized by the Disposal Commissioners, who have specifically requested that a sales and distribution plan be incorporated in all purchase proposals, the RTA letter noted.

The members of RTA who are classified as "dealers" are, in fact, rubber merchants, whose function is the buying and selling of rubber, and whose operations include importing, financing, inspection, warehousing, shopping and the extension of credit to purchasers. The major portion of the natural rubber consumed in the United States is handled by this group, and the service rendered is recognized as an important and essential factor in the operation of the rubber industry.

While a few manufacturers purchase a limited amount of natural rubber through buying offices in the Far East, generally speaking, the requirements of practically all small manufacturers and also a substantial percentage of the requirements of the large manufacturers are handled through the dealer members of RTA. Up to the present time, the activity of the dealers has been confined primarily to the merchandising of natural rubber, although agency functions have been performed in connection with the purchase of synthetic rubber.

With the sale of the synthetic plants to private enterprise, however, and the existence of a number of sources of supply for this material on a commercial basis, RTA believes the functions of the dealers can be expanded and the present services implemented if arrangements can be concluded whereby a manufacturer's requirements for both natural and synthetic rubber can be satisfied through one source of supply.

Marketing Procedures

RTA recognizes that some of the large manufacturing companies who will undoubtedly become purchasers of synthetic plants may merchandise surplus material through their own organizations, and the same may be true of the combinations of manufacturing companies who are potential purchasers. On the other hand, dependent upon the quantity involved, it may prove desirable and more economical to utilize existing marketing facilities. In any event, it appears reasonable to assume that some of the synthetic rubber facilities may be purchased by companies who are not engaged in the manufacture of rubber products. In these cases, it will be necessary to establish a sales organization to merchandise synthetic rubber, and in all probability such organization will not be familiar with the consumption requirements of rubber manufacturing companies.

In summarizing its position, RTA stated that a large number of dealer organizations are in existence today who are fully equipped in every way to handle the distribution of synthetic rubber on a commercial basis, and who possess a background of many years experience in the marketing of all types of rubber, which includes, among other things, a knowledge of the individual manufacturer's requirements for both synthetic and natural rubber, with particular reference to the small consumer. These organizations are available to implement the disposal program insofar as the question of the merchandising of synthetic rubber to consumers is concerned, and it is believed that their services can be utilized to excellent advantage by the ultimate purchasers of the synthetic rubber facilities.

The RTA letter concluded by stating that its suggestions are intended to be constructive, and should a program be developed along the lines suggested, it will prove of mutual benefit to all parties concerned. RTA will be pleased to receive reactions to the suggestions contained in its letter, and if the utilization of the services of existing dealer organizations is practicable and desirable, the organization is available to discuss the question in more detail. The matter can also be discussed with any of the various dealer members of the Association.

American Cyanamid Appoints Two

The Research Division of the American Cyanamid Co., Bound Brook, N. J., has announced the appointment of Dr. Joseph H. Paden as director of the laboratories and Dr. Mario Scalera as director of research. Dr. Paden, who has been with Cyanamid since 1937, began as a research chemist at the Stamford Laboratories. He was named group leader in 1942. In 1950 he was named director of the Laboratories' Research Department, a post which he held until his recent promotion. He received his B. S. degree in 1932 from the University of Illinois, an M. S. degree from the University of Minnesota, and a Ph. D. from the University of Wisconsin. Dr. Scalera has been with Cyanamid since 1935. He began as a research chemist at Bound Brook, and was named group leader in charge of vat dye research in 1939. In 1943, he became sectional director of vat dye and pigment research, and five years later was promoted to assistant director of research in charge of dyes, pigments and intermediates research. Dr. Scalera was graduated from Yale University in 1932 with a B. S. degree in chemistry and received his Ph. D. from Yale in organic chemistry in 1935.

Chemical Exposition News

The 8th National Chemical Exposition, set for the Chicago Coliseum, Chicago, Ill., on October 12 to 15, will also be a center for a series of important chemical meetings and other activities. The list includes joint meetings with the Manufacturing Chemists' Association, the Chemical Market Research Association, the Society of the Chemical Industry, and the Purchasing Agents' Association. All will hold technical programs. In addition there will be The Industrial and Engineering Chemistry Lecture Series, conducted by the editors of *Industrial and Chemical Engineering*. Also featured will be "Chemical Trail Blazers", an exhibit of new ideas in chemistry. Over 34,000 square feet of balcony and exhibit floor space have been allocated to educational exhibits.

Glidden Building New Plants

Glidden Co., Cleveland, Ohio, has announced plans for the construction of a pilot plant at Sparrows Point, Md., for the production of titanium metal by a new electrolytic process. The company will also build a factory to produce titanium dioxide at the same site. The cost of the two plants will be about $12,000,000. Construction began on September 1 and the new facilities are expected to be in production by the middle of 1955.

Named Rubber Division Librarian

Lillian Sutter

Miss Lillian Sutter, a recent graduate of the University of Akron, Akron, Ohio, has been named by the University to take charge of its technical library. Miss Sutter will also be in charge of the library maintained by the Division of Rubber Chemistry of the American Chemical Society at the University. She succeeds Miss Betty Jo Clinebell, who recently resigned. Miss Sutter worked in the University library for three years while attending the University from which she was graduated with a B.S. degree. An expert swimmer and rifle marksman, Miss Sutter is a member of the University's Chemistry Club.

Fabricating "Andal" Foam Rubber

A specially designed new plant, standing on a five acre plot in Oceanside, N. Y., will be the new home of Eastern Foam Fabric Co., of Brooklyn, a leading distributor of "Andal" foam rubber for the Andrews-Alderfer Company of Akron, Ohio. For the first time, all equipment necessary for the fabrication and distribution of foam rubber will be housed under one roof—for laminating, perforating and cutting every foam rubber combination used by any manufacturer in the shoe industry. The new plant has a working area of 25,000 square feet. Plant and facilities are tangible proof of the growth of Eastern from its beginning in 1949 by Murray Ullian and George Kern, in a small plant of only 2500 square feet at 17 Moultrie street, Brooklyn. The new plant was to have been ready for occupancy about September 1.

Kendall Promotes Brown

Kendall Co., Walpole, Mass., has announced the election of Edward H. Brown as divisional vice-president. He will continue as director of sales for the entire Chicago division which includes Bauer & Black, Polyken Products, Bike Web Co., Burson Knitting Co. and Blue Jay Products. It also was announced that W. O. Lindholm will assume Mr. Brown's former duties as general sales manager for Bauer & Black and Curity Products. John O. King, Jr., will succeed Mr. Lindholm as field sales manager.

Carbon Black Production Falls

Both production and shipments of carbon black during the first half of 1954 declined from the like six months period of 1953, by 17 and 12% respectively, the Bureau of Mines, U. S. Department of the Interior reported recently. Stocks, however, were cut 36,000,000 pounds during the January-June, 1954, period, although showing higher compared with stocks of June 1953. Shipments of carbon black in June 1954 advanced above the May figures, but fell short of the June 1953 totals, 126,599,000 pounds, 122,278,000 pounds and 140,572,000 pounds respectively. Shipments during the first half of 1954 amounted to 733,329,000 pounds, compared with shipments of 836,448,000 pounds in the like period of 1953.

Carbon black production in June 1953 totalled 113,252,000 pounds, compared with an output of 119,671,000 pounds in May and 135,840,000 pounds in June 1953. Production for the first half amounted to 697,500,000 as against 837,345,000 pounds in the first half of 1953. Stocks of carbon black on hand at the end of June 1954 totaled 368,585,000 pounds compared with 355,739,000 pounds at the end of June 1953.

Reports on Plant Progress

Construction of the Torrance, Calif., plant of the Carbide and Carbon Chemicals Co. is proceeding as planned and good progress has been made, according to H. B. McClure, company president. Mr. McClure was commenting upon a recently published article which stated that plans for the Torrance plant "are believed to have been temporarily shelved." At present, construction has been completed on all service buildings. All major equipment has been purchased and contracts for construction of foundations, underground piping, and process buildings have been awarded to a group of contractors working on a joint venture. It is expected that the plant will be in full operation by the end of 1955. Initially, the plant will produce 60,000,000 pounds of polyethylene and substantial volumes of ethylene oxide, ethylene glycol, and ethylene glycol anti-freeze. The investment in the plant will be upwards of $36,000,000, the company states. The new plant will be the first on the West Coast to manufacture polyethylene and ethylene glycol.

New Military Specification

The Bureau of Ships has recently issued a new military specification, "MIL-R-2765." This specification covers oil-resistant rubber materials that will be suitable to —20°F. Inasmuch as this is a qualification specification, interested manufacturers are invited to communicate with the Bureau of Ships, Department of the Navy, Washington 25, D. C., regarding authorization of qualification tests.

The structural strength of steel and the handsome, durable qualities of vinyl plastic are combined to form a composite sheet material used in the manufacture of IBM's Bank Proof Machine housings. The vinyl-steel laminate is supplied by the Hood Rubber Division of Goodrich.

Witco Advances Tumpeer

Joseph J. Tumpeer

Joseph J. Tumpeer has been appointed senior vice-president of the Witco Chemical Co., New York, N. Y. He will direct the company's Pioneer Asphalt Division, which has plants at Perth Amboy, N. J., and Lawrenceville, Ill. Mr. Tumpeer has been affiliated with Witco since 1921. He served initially in the Chicago office, and later was appointed vice-president and general manager of the Pioneer Asphalt Division. His offices are at Witco's New York headquarters.

Olin-Mathieson Merger Complete

The merger of Olin Industries, Inc., and the Mathieson Chemical Corp. became effective on August 31, according to an announcement by John M. Olin, president of Olin Industries, and Thomas S. Nichols, president of Mathieson. Mr. Olin will be chairman of the new company and Mr. Nichols will be president. John W. Hanes will be chairman of the Finance Committee. The names of the other executive officers of the corporation will be announced following the first meeting of the new board of directors which was scheduled to be held on September 9. Olin Mathieson Chemical Corp. common stock will be traded on the New York, Midwest, Boston and San Francisco stock exchanges beginning September 1. The preferred stock of the corporation is also listed on the New York Stock Exchange.

Recent DuPont Publications

Among recent technical reports issued by the Rubber Chemicals Division of E. I. du Pont de Nemours & Co., Inc., are BL-258, BL-259 and BL-260. The first of these is entitled "Hypalon for Tank Linings for Corrosive Chemicals", while the second is entitled, "Tepidone for Low Cost Curing of Latex Compositions." The third report is on "The Use of Neoprene Type WRT in Neoprene Jacketed Flexible Cords." In addition, the Division has issued Report No. 54-2 by W. G. Ogden. This report concerns itself with "Butyl Accelerator 21", a combination of accelerators specifically designed for curing Butyl rubber.

GERMAN RUBBER ASSOCIATION SCHEDULES OCTOBER MEETING IN MUNICH

The German Rubber Association has announced that its principal meeting and lecture session for 1954 will be held at the Regina-Palace Hotel in Munich, Germany, on October 21 to 23. The meeting will be on Thursday, October 21. Dr. Erich Konrad (Leverkusen), chairman of the Association, will deliver the introductory address. The meeting will end in the afternoon of Saturday, October 23. In addition to the lectures and discussion periods, the meeting will also feature special tours, plant visits and a special program for the ladies.

The Association has made available a listing of the papers to be presented at the meeting. Titles of the papers and their authors follow:

(1) Comparative Investigation of Methods for Analyzing the Surface of Fine Particles and Proposal of a Technically Simple Method of Conducting the Analysis (Albrecht).

(2) New Natural Rubber-Resin Combinations (Van Alphen).

(3) The Oxidative and Non-Oxidative Thermal Degradation of Rubber (Van Amerongen).

(4) Dynamic-Mechanical Properties of Rubber Compounds (Van Amerongen).

(5) Apparatus for Dynamic Measurement of Hysteresis and Modulus of Elasticity of Vulcanized Rubber Compounds (Angioletti).

(6) Latest Developments in the Determination of Sulfur in Natural and Synthetic Rubber Compounds (Bauminger).

(7) Theoretical Calculations and Electronic Measurement of the Dynamics of Tennis Balls (Chiesa).

(8) Relation of Temperature to Abrasion Tests (Clamroth).

(9) Investigation of Natural Rubber Tires (DeDecker).

(10) Bound Rubber.

(11) The Technical Properties in Rubber of Silica Fillers in Relation to Their Specific Surface (Ecker).

(12) Bound Rubber in Experimental and Structural Performance (Feuchter).

(13) Protection Against Certain Special Forms of Aging (Giger).

(14) The Statics of Pneumatic Tires (Hofferberth).

(15) Tear Growth and Tear Testing of Natural Rubber and Synthetic Elastomers (Kaiser).

(16) Problems of Physical Testing of Vulcanizates (Kainradl).

(17) Influence of Construction on the Dynamic Properties of Cords (Kainradl).

(18) Work on Judging the Repression of Dynamic Fatigue in Tires (Kern).

(19) Natural and Synthetic Rubber in Competition (Kränzlein).

(20) Tire Noise—Vehicle Noise (Lustgebrune).

(21) Colloidal Forces in Neoprene Latex and Other Synthetic Rubber Latices (Livingston).

(22) Principles of Stress-Strain Control in Linear High Polymers (Müller).

(23) Holofol-Process, Its Development, Possible Applications, and Practice (Opavsky).

(24) Cold Rubber (Orth).

(25) Testing and Evaluation of Rubber and Synthetic Foams (Paffrath).

(26) The Influence of Antioxidants on the Ozone Cracking of Rubber (Van Pul).

(27) Secondary Structure in Vulcanization (Pehle).

(28) Insoluble Sulfur (Reissinger-Jonas).

(29) Studies of the Abrasion of Vulcanizates (Scheele).

(30) The Vulcanization of Rubber with Thiuram Disulfides (Scheele).

(31) The Importance of Pre-Treatment of Rubber with Steam for Mechanical Properties in Comparison with Untreated Rubber (Stein).

(32) The Use of Silica in the United States Rubber Industry (Wolf).

(33) Unusual Types of Latex Foam (Van't Wout).

(34) Paper Chromatographic Analysis of Accelerators (Zijp).

Wire and Cable Symposium

The Third Annual Wire and Cable Symposium jointly sponsored by the Signal Corps Engineering Laboratories, Fort Monmouth, N. J., and the wire and cable industry will be held on December 7 through 9, 1954, at the Berkeley Carteret Hotel, Asbury Park, N. J. A program is being arranged covering the following topics: wire and cable materials, their characteristics and uses; wire and cable constructions, together with manufacturing and equipment problems; field construction methods, and uses in systems operation. All companies and agencies represented at previous symposia will be contacted. Others interested in attending may obtain further details by contacting Mr. H. L. Kitts, Coles Signal Laboratory, Fort Monmouth, N. J.

Releases 12 Wire Standards

Twelve standards for insulated wire and cable have been released by the American Standards Association, 70 East 45th St., New York 17, N. Y. These standards were developed by the American Society for Testing Materials and submitted to ASA for approval. Eleven of these standards are designated as C8.23-33 and include specifications for such characteristics as physical properties, voltage test, insulation resistance, thickness and workmanship, for the following insulation compounds: performance rubber and synthetic rubber, heat-resisting rubber and synthetic rubber, rubber sheath, GR-S, ozone-resistant type insulation, polyvinyl, GR-M polychloroprene sheath (where extreme abrasion resistance is not required), GR-M polychloroprene sheath (regular), and thermoplastic vinyl polymer. Another standard, C8.22, outlines methods of testing rubber insulated wire and cable. This standard shows how to perform tests of physical properties, aging tests, voltage tests, insulation resistance measurements, moisture absorption, ozone resistance and flame tests.

Recent OTS Rubber Report

The Office of Technical Services of the U. S. Department of Commerce has made available a report on government research into rubber technology entitled, "Low Temperature and Low Volatility Plasticizers for Use in Nitrile Rubber Vulcanizates". The report is described in a recent issue of the *Bibliography of Technical Reports* (BTR), published by the Commerce Department. The report was prepared by personnel from the Rock Island Arsenal Laboratory and is 36 pages long with charts, tables and a photograph. PB 113733 is available from the Library of Congress, Publication Board Project, Washington 25, D. C., for $2.50 in microfilm and $5.50 for photostatic copies.

"Sorry boss, I didn't know you were in there slee—I mean working!"

New Post for Richard Comes

Richard N. Comes

Richard N. Comes, sales engineer for the Farrel-Birmingham Co., Inc., Ansonia, Conn., has been appointed to handle the sale of rubber and plastics processing machinery in New England. Mr. Comes succeeds Raymond H. Perkins, who has been transferred to the West Coast. He was graduated from Lehigh University in 1951 with a degree in mechanical engineering and joined the company that year as a student engineer. He became a technical assistant in 1953 and was appointed sales engineer last June.

Announces Two New Chemicals

Two new commercial chemicals, *N*-butyl aniline and *N*-2-ethylexyl aniline, are now available for the first time in drum quantities from Carbide and Carbon Chemicals, New York, N. Y. Compared with aniline and the lower *N*-alkyl anilines, these new products have several advantages, such as lower water solubilities, higher boiling points, lower vapor pressures, lower toxicities, and higher solubilities in oil or hydrocarbons, the company states. These compounds should be applicable in processes requiring *N*-alkyl anilines in the production of rubber chemicals, dyes and pigments, surface-active agents, flotation reagents, explosives and propellant stabilizers, gum and corrosion inhibitors, oil and gasoline additives, resins and plastics, textile processing chemicals, pesticides, varnishes, and coatings.

Utility Charges Audit Offered

Rateonics Corp., Dallas, Texas, is prepared to offer impartial audits and surveys of utility charges to rubber manufacturers interested in reviewing their present rates. The service is based on the premise that few utility consumers are aware of the large number and complexity of electric, gas, water and steam rates on file with the federal and state power commissions, and that it is their responsibility—not the utility company's—to select lowest rates. Rateonics has opened an Eastern Division office in the Hotel Empire Building, Broadway at 63rd St., New York 23, N. Y.

Naugatuck Introduces Nitrex 2614

Naugatuck Chemical Division of the U. S. Rubber Co., Naugatuck, Conn., has released data on "Nitrex 2614", said to be a new type of nitrile latex. The product was specifically developed to give good adhesion to cellulose. Vulcanized films of Nitrex 2614 show considerable resistance to oil and solvents such as are used in dry cleaning. Adhesion to many surfaces such as cotton or rayon fibers, wood, paper, metal surfaces and polyvinyl chloride films is very good, the Division states. The product also appears to have considerable adhesive affinity for color pigments and dyes. Films of zinc oxide vulcanized Nitrex 2614 show excellent resilience and snap. The product may be extended with fillers such as clay and whiting or may be blended with other latices of the butadiene-styrene or butadiene-acrylonitrile types. After 60 minutes at 60°C., Nitrex 2614 exhibits a tensile psi of 3250, an elongation of 660% and permanent set at 18%. At 140°C. for 30 minutes the product shows a tensile psi of 2800, elongation of 670% and permanent set of 18%. With total solids of 38 to 40%, the material weighs 8.3 pounds per gallon. It has low viscosity, good stability and has no film odor.

Doll Skins Which Sun Tan

According to a recent announcement, William Schepp, president of Schepp Laboratories, 21-23 Summit Avenue, East Paterson, N. J., has developed a doll skin that will tan when exposed to the sun and will revert to its original color when left indoors for several hours. So far, Mr. Schepp has perfected a formula which functions on an inert surface like methacrylate. As the vinyls and rubber compositions are reactive, Mr. Schepp is aiming for the development of a different formula that will not be affected by the reactivity or where the reactivity itself might be tied in with the developing and reversion process.

Acquires Bagley & Sewall

Bagley & Sewall Co. of Watertown, New York, has been acquired by the Black-Clawson Co. of Hamilton, Ohio. Both companies produce a line of paper making machinery and, in addition, Bagley & Sewall produces rubber machinery. Terms of the transaction were not announced. It was stated, however, that Bagley & Sewall will be operated as a division of Black-Clawson. William A. White, Jr., associated with Black-Clawson for the past fifteen years, has been named vice-president and general manager of the new Bagley & Sewall Division.

General Tire Names Biel

General Tire & Rubber Co. of Akron, Ohio, has announced the appointment of A. T. Biel as purchasing agent of its Ashtabula, Ohio, chemical plant. Mr. Biel, who has been affiliated with the company's purchasing operations since 1950, is headquartering at the Ashtabula plant, now in its final stages of construction.

McLaren Joins Bell Clay

John R. McLaren

John R. McLaren has been appointed sales manager for the Bell Clay Co. of Gleason, Tenn. Bell Clay is now engaged in marketing special clays for the rubber industry produced by the Bell Kaolin Co., also of Gleason. Mr. McLaren is also serving as sales manager of Bell Kaolin and Bell Minerals of West Paris, Maine. Bell Kaolin maintains a modern producing plant at Batesburg, S. C. Mr. McLaren maintains headquarters at East Liverpool, Ohio.

Seiberling Producing Seilon

Seiberling Rubber Co., Akron, Ohio, is now producing "Seilon PVC," a new rigid plastic, in commercial quantities at its recently completed Newcomerstown, Ohio, plant. Up to now the company has manufactured the plastic on a pilot plant basis in its Akron tire plant. The company makes Seilon in sheets and plates by laminating calendered sheets of the material. Seilon rods and bars will also be made. Useful in the building trades and in industry where materials are needed that resist corrosion and weathering and are light, yet strong, the plastic is also useful for lining tanks and other equipment that comes in contact with acids and other corrosive chemicals.

Methylbenzyl Ether Available

Methylbenzyl ether (bis-alpha-methylbenzyl ether), is now available in tank car quantities from the Carbide and Carbon Chemicals Co., New York, N. Y. Methylbenzyl ether is said to be a superior softener and tackifying agent for nitrile rubber. The chemical structure of methylbenzyl ether indicates high solvent power for synthetic resins at elevated temperatures and its possible use as a plasticizer or plasticizer extender. Methylbenzyl ether may be of value as a solvent in countercurrent extractions of antibiotics and other pharmaceuticals.

New dolls and toys are being molded of soft, flexible plastisols based on Bakelite vinyl resins by the Jay Zee Doll Co., 55 North 4th Street, Brooklyn 11, N. Y.

NAMES IN THE NEWS

DR. J. C. PULLMAN, formerly assistant to the manager of the new Product Development Department, American Cyanamid Co., has been named manager of technical service of the company's Petrochemicals Department.

JOHN C. BALL, JR., formerly associated with E. I. du Pont de Nemours & Co., Inc., has joined the Polychemicals Division of the West Virginia Pulp and Paper Co. as a technical representative.

MARTY ADLER, associated with the Plymouth Rubber Co. for the past fifteen years, has been appointed U. S. sales manager for the Sundries Division of the company.

HARDING WING, formerly associated with Stein, Hall & Co., has joined the laboratory staff of the Alco Oil & Chemical Corp. in Philadelphia, Penna.

WILLIAM O. RILEY, formerly assistant superintendent of the Anderson, Ind., mill of the Anaconda Wire & Cable Co., has been promoted to the position of superintendent of the newly-expanded Anaconda mill at Orange, Calif.

JOSEPH CLEARY, formerly a development engineer for the Quaker Rubber Corp., has been named plant engineer. He will be responsible for the specifications and design of all new equipment and maintenance and repair of present plant facilities.

WILLIAM D. GOHR, associated with the Firestone Tire & Rubber Co. since 1924, has been appointed director of defense activities for the company.

H. E. HUMPHREYS, JR., chairman of the board and president of the U. S. Rubber Co., has been elected a member of the board of trustees of the Mutual Life Insurance Co. of New York.

DR. PER K. FROLICH, vice-president of Merck & Co., Inc., Rahway, N. J., has been named to the top civilian post in the Army Chemical Corps. He will serve in the dual capacity of Deputy Chief Chemical Officer for Scientific Activities, and Chief Scientist for the Corps.

W. G. W. BIRD, managing director of Auto Tyre Services, Ltd., Basingstoke, England, has been appointed to the board of the Wayne Rubber Co. (Pty.), Ltd., Rossburgh, Natal, South Africa, as a director resident in England.

DR. IRL C. SCHOONOVER, formerly assistant chief of the Organic and Fibrous Materials Division and chief of the Polymer Structure Section of the National Bureau of Standards, has been appointed chief of the Mineral Products Division.

ARTHUR B. GOETZE, formerly vice-president of manufacturing for the Eastern area of the United States for the Western Electric Co., has been elected vice-president of finance succeeding FREDERICK W. BIERWIRTH, who retired on August 31 under the company's age retirement rule.

JEROME J. DAVIS has been named secretary-treasurer and consumer relations manager of the Artistic Latex Form Co., Brooklyn, New York.

LESTER HILL, associated with the Dunlop Tire & Rubber Corp. since 1927, has been named southeast regional sales manager and will supervise sales operations in the company's Atlanta, Richmond and Memphis divisions.

ALBERT W. COOK has been named chief project engineer, DONALD G. SMELLIE appointed head of the research and development section and CHARLES F. LUGINBILL placed in charge of all testing activities and laboratory operations within the aircraft wheel and brake development department of the Goodyear Aircraft Corp.

COLONEL H. F. SYKES, JR., recently assumed command of the main research center of the Corps of Engineers, the Engineer Research and Development Laboratories at Fort Belvoir, Va.

JOHN J. SEXTON, associated with the B. F. Goodrich Co. since 1935, has assumed the sales duties of Los Angeles district field manager for the Associated Tires and Accessories Division of the company.

WALTER N. ALEXANDER has been appointed director of Operational Planning of the Dyestuff and Chemical Division of the General Aniline & Film Corp.

ALLEN P. LUCHT has been appointed treasurer of the Industrial Rayon Corp. He has been vice-president and treasurer of the Rainbow Production Corp. and vice-president of Scurry-Rainbow Oil, Ltd., and other companies in the Rainbow Oil group for the past two years.

LEWIS F. JOLLY, treasurer of the Armstrong Rubber Manufacturing Co., has been elected vice-president of the Quad Cities Control of the Controllers Institute of America.

JOSEPH A. HUISKING has retired as a vice-president and director of Fritzsche Brothers, Inc., for reasons of health. He has also retired as treasurer and director of the affiliate company, Fritzsche Brothers of Canada, Ltd.

ROBERT U. HASLANGER, formerly director of sales for the Plastics Division of the Monsanto Chemical Co., has been appointed to the administrative staff of the Stauffer Chemical Co.

"Man-Lift" Belt Elevator

New York City's first "Man-Lift", a continuous rubber conveyor belt elevator, has been installed in a large underground garage which holds four levels of parked automobiles. The 105-foot, five-ply, rubber and cotton, vertical rubber belt, 14 inches wide, was made by the Goodyear Tire & Rubber Co. for the J. B. Ehrsam & Sons Mfg. Co., designer of the "Man-Lift". Serving four levels of the underground garage, the "Man-Lift" has steps placed approximately every 16 feet to carry parking attendants from floor to floor at the rate of 75 feet a minute. Four and one-half feet above each step a handle is

fastened to the belt for the safety of the riders. The unit can carry eight persons a minute in both directions. Goodyear belting employed in the installation is of the rubber and fabric type with friction surface. The steps are covered with a rubber-grit, non-skid surface also made by Goodyear. A three horsepower electric motor, which can be stopped or started by anyone on or off the lift by pulling a parallel rope, propels the conveyor around two pulleys 20 inches in diameter, one at the top and one at the bottom. The accompanying photograph shows two parking attendants using the "Man-Lift". The man on the left is going up, while the man on the right is going down.

Koppers' Investment Guaranteed

The government's Foreign Operations Administration has announced that it will guarantee a $465,000 investment by the Koppers Co., of Pittsburgh, Penna., in La Société Houilleres - Pechiney - Progil, a French concern which is producing styrene monomer. This was the sixty-eighth such guarantee made by the F.O.A. under the government's program to encourage American investments abroad. Under the guarantee, the F.O.A. will pay Koppers its investment if the company is unable to collect from the French concern due to currency exchange restrictions. The F.O.A. would then take the currency payments from the French concern for use by the government.

Appointed Chief Chemist

E. E. Laughlin

E. E. Laughlin has been appointed chief chemist of the Illinois Industrial Rubber Co., of Ladd, Ill. His first assignment for the company will be to design and supervise the expansion of the company's laboratory and testing facilities. Previously, Mr. Laughlin had been technical manager of the General Tire & Rubber Co. plant at Waco, Texas, for four years. He was graduated from the Carnegie Institute of Technology in 1927 with a degree in chemical engineering, and was later employed by the Pennsylvania Rubber Co. and the Pharis Tire and Rubber Co. as assistant chief chemist and chief chemist, respectively. He was also technical advisor to a rubber company in Buenos Aires, Argentina, for one year.

Goodrich Licensed by Elastomer

B. F. Goodrich Chemical Co., Cleveland, Ohio, has been licensed by the Elastomer Chemical Corp., of Newark, N. J., to engage in development work with Elastomer's patented continuous foam vinyl process. Goodrich reports that its technical staff is prepared to render service to other licensees on the application of Geon vinyl dispersion resins to this process. In the Elastomer process, inert gas is dissolved under high pressure in a vinyl plastisol. The foamed plastisol is then released through a spray nozzle into a mold or onto a casting surface and fused to form the finished product. The process can be used for the production of continuous sheet as well as molded items. Products which can be made by this method are: automobile and furniture cushioning, soundproofing and insulating material, mattresses and rug backing.

Building New Laboratory

Battelle Memorial Institute has announced plans to build a chemical engineering laboratory at its Columbus, Ohio, headquarters. Dr. Clyde Williams, Battelle director, said the one-story building will contain 4,750 square feet of floor space, fitted with the most modern equipment, but the cost of the project was not disclosed.

H. K. Porter Negotiates Loan

The private placement of $13,000,000 of its promissory notes was announced on August 24, by T. M. Evans, president of H. K. Porter Co., Inc. Mr. Evans stated that the notes mature on the 1st of August, 1969 while the first payment is to be made on August 1, 1955. The First Boston Corp. acted for the company in the transaction. Mr. Evans said that the funds would be used to further the company's expansion plans which already this year have resulted in the purchase of the McLain Fire Brick Co., Pittsburgh, Penna., and Pioneer Rubber Mills, Pittsburg, Calif. The Porter company recently reported its sales for the first half of 1954 were $32,447,304.06 and that earnings were $1,116,039.76 or $4.20 a common share after preferred dividends. The company's total assets at half-year time were $35,798,748.13. Sales have climbed from under $10,000,000 in 1949 to more than $60,000,000 last year. Other Porter divisions are: Alloy Metal Wire, Buffalo Steel, Connors Steel, Delta-Star Electric, Leschen Wire Rope, Quaker Rubber Corp., the Watson-Stillman Co., and Watson-Stillman Fittings.

Enlarges Charleston Laboratory

United Carbon Co., Inc., Charleston, West Va., has announced that the research facilities in its Charleston laboratory are being substantially enlarged and the working area reallocated for more effective use. With the installation of new equipment, the company will have in Charleston the most complete and up-to-date facilities for the study and evaluation of carbon blacks in rubber, plastics, inks, paints and sundry applications. These facilities complement the general research laboratory at Borger, Texas, and the control laboratories and experimental units at various plants. The research laboratory is under the direction of Dr. I. Drogin with Dr. A. G. Susie as assistant. Working with them is a group of experienced carbon black technicians. The principal activities of the laboratory staff are devoted to sales-service problems, development work on carbon black, and all problems relating to carbon black utilization.

Fire Hits Perlfoam Company

Four firemen were overcome by heat and smoke in a recent fire which hit Perlfoam Manufacturers, 5730 Harvey Wilson, Houston, Texas. The fire is said to have started in a rubber processing unit and spread to an area where foam rubber was stored. It was reported that a good deal of this stock had been destroyed. In addition, the building suffered water and smoke damage.

Opens New Sales Office

Rubber Corporation of America has opened a sales office at 511 Fifth Ave., New York 17, N. Y., primarily to handle "Rucoam" plastic film and sheeting. The company's general offices and laboratories are now located in the recently completed addition to the factory at Hicksville, Long Island, N. Y.

Pioneer Names Works Manager

C. L. Kenny

C. L. Kenny has been named works manager in charge of all factory and production facilities of the Pioneer Rubber Mills, San Francisco, Calif. Mr. Kenny was formerly manager of products at the Quaker Rubber Corp., and has a twenty-year background in the rubber industry. He has held such positions as production control manager, assistant to the director of manufacturing, and manager of products. Both Pioneer and Quaker are divisions of the H. K. Porter Co., Inc. Although each retains its own identity, they operate in conjunction with each other.

Shelve Tire Firm Stores Bill

The Senate Judiciary Committee has "postponed indefinitely" action on S 175, a bill to outlaw manufacturers' stores in the retail tire field. The full committee, in effect, killed the bill for the last session of Congress despite a favorable recommendation from a three-man subcommittee. The subcommittee, represented by Senator Hendrickson (Rep., N.J.), took testimony on the bill in May. Akron rubber companies, generally, and the U. S. Justice Department strongly opposed the measure, which was sponsored by George J. Burger, vice-president of the National Federation of Independent Business. Sponsors of the bill said the company stores provided unfair competition for independents and was driving small businessmen out of business. Opponents said it would have provided an unfair restraint on tire sales and would lead to higher prices for consumers.

Cog Engineering Products Formed

George M. Kovac has announced the formulation of the Cog Engineering Products Co. at 333 North Michigan Avenue, Chicago 1, Ill., specializing in methods and manufacturing machinery for continuous processing in industry. Mr. Kovac will serve as president, and has resigned as vice-president in charge of sales, export and new developments with the W. J. Fitzpatrick Co. to devote full time to the new organization.

FINANCIAL NEWS

Goodyear Tire & Rubber Co.

Six Months to June 30: Net income of $24,622,670, which is equal to $5.12 a common share, compared with $22,997,684, or $4.76 a share, in the first half of 1953. Net sales in the first half of 1954 amounted to $551,346,412, compared with $616,315,503 in the 1953 period. Several factors contributed to the improvement in net income in the face of declining sales, according to the report. With the decline in sales and discontinuance of the excess profits tax, U. S. and foreign income taxes were reduced from a toal of $41,913,183 to $28,884,059 for the six months. From the income of foreign subsidiaries amounting to $9,163,004, the company received dividends of $6,402,100 during the half-year and, in addition, included in income an amount of $1,809,000 representing the recovery, through remittances of foreign income previously reserved, less the current provision for restricted foreign earnings. The reserve for foreign investments now amounts to $18,906,169. As of June 30, 1954, Goodyear's working capital was $410,000,000 and the ratio of current assets to current liabilities was 6.9 to 1 compared with 4.7 to 1 a year ago.

Seiberling Rubber Co.

Six Months to June 30: Net profit of $161,097, which is equal to 14½c a share, compared with $525,337 for the first half of 1953. Net sales for the first six months of 1954 amounted to $17,438,694, compared with $20,911,260 for the first half of 1953. Half-year earnings have erased a first-quarter loss, the company's first red ink period since 1949, although sales for the first half of the year were behind the comparable period in 1953. The sales decline, the company president said, was largely due to a sharp drop in truck tire sales, including original equipment, military orders and the replacement business.

Union Asbestos & Rubber Co.

Six Months to June 30: Net income of $291,119, which is equal to 61c a share, compared wtih $147,576, or 31c a share, in the first six months of 1953. The 1954 figures exclude a profit of $213,617, or 45c a share, from the sale of property. Net sales for the first half of 1954 amounted to $7,382,053 compared with $5,753,327 in the same period of 1953.

Hewitt-Robins Inc.

Six Months to June 30: Net income of $382,506, which is equal to $1.33 a common share (after preferred dividends), compared with $511,115, or $1.78 a share, in the corresponding period of 1953. Net sales for the first half of 1954 amounted to $18,090,237 compared with $18,877,688 in the first six months of 1953.

B. F. Goodrich Co.

Six Months to June 30: Estimated net income of $18,232,853, which is equal to $4.33 a common share, compared with $16,874,655, or $4.03 a share, in the first half of 1953. Net sales in the first half of 1954 amounted to $304,935,288, contrasted with $350,385,793 in the first half of 1953. Net working capital amounted to $216,653,701 on June 30, 1954, compared with $205,766,353 on June 30, 1953. Inventories on June 30, 1954, amounted to $123,290,852, contrasted with $137,783,627 on June 30, 1953. The company has changed its accounting procedures with respect to depreciation as provided for under the 1954 Revenue Act. As a result, further increases in the reserve for increased replacement cost of facilities have been discontinued and the $500,000 deducted for this purpose in the first quarter of 1954 has been restored to earnings.

Parker Appliance Co.

Year to June 30: Consolidated net income of $686,443, which is equal to $1.77 a share, compared with $1,014,306, or $2.62 a share, in the year ending June 30, 1953. Consolidated sales for the year ending June 30, 1954, amounted to $22,397,303 compared with $22,072,170 in the previous year. The backlog of unfilled orders approximated $10,800,000 as of last June 30.

Mansfield Tire & Rubber Co.

Six Months to June 30: Net income of $287,762, which is equal to 52c a share, compared with $831,332, or $1.50 a share, in the same period of 1953. Sales and other income in the 1954 period amounted to $24,984,955 compared with $33,192,858 in the first half of 1953.

Stauffer Chemical Co.

Six Months to June 30: Net income of $2,927,418, which is equal to $1.25 a share, compared with $2,851,069, or $1.39 a share, in the six-month period ended June 30, 1953. Gross sales for the 1954 period amounted to $40,081,152, compared with $38,257,262 in the first half of 1953.

Brown Rubber Co.

January 1 to July 3, 1954: Net income of $408,006. Earnings retained in the business at the beginning of the period amounted to $4,276,331, compared with $4,496,019 as of July 3, 1954.

Baldwin Rubber Co.

Year to June 30: Net income of $1,101,442, which is equal to $2.54 a share, compared with $928,191, or $2.14 a share, for the year ended June 30, 1953.

United Carbon Co.

Six Months to June 30: Net income of $2,008,386, which is equal to $2.52 a share, compared with $1,945,317, or $2.44 a share, in the first half of 1953. Net sales for the 1954 period amounted to $17,086,626 compared with $18,121,404 for the first half of 1953. There are 795,770 capital shares outstanding.

National Rubber Machinery Co.

Six Months to June 30: Net income of $430,401, which is equal to $2.20 a share, compared with $504,672, or $2.86 a share, in the corresponding period of 1953. Sales for the 1954 period amounted to $5,431,000 compared with $11,993,000 for the first six months of 1953.

Columbian Carbon Co.

Six Months to June 30: Net income of $2,486,348, which is equal to $1.54 a share, compared wtih $2,593,173, or $1.61 a share, in the corresponding period of 1953. Sales for the first half of 1954 amounted to $27,155,806 compared with $27,003,189 in the same period of 1953.

Armstrong Cork Co.

Six Month to June 30: Net income of $5,818,540, which is equal to $3.56 a common share, compared with $5,167,253, or $3.32 a share, in the first half of 1953. Sales in the 1954 period amounted to $106,078,788, compared with $112,915,463 in the first six months of last year.

U. S. Rubber Reclaiming Co.

Six Months to June 30: Net loss of $88,490, which includes a tax credit of $93,613, compared with a net profit of $134,552 in the corresponding period of 1953.

Canada Wire & Cable Co.

Six Months to June 30: Net income of $759,000, which is equal to $3.69 a share, compared with $913,000, or $4.45 a share, in the corresponding period of 1953.

Garlock Packing Co.

Six Months to June 30: Net income of $383,187, which is equal to 91c a share, compared with $708,316, or $1.69 a share, in the first half of 1953.

Set To Supply Tubeless Tires

W. S. Richardson, president of the B. F. Goodrich Co., Akron, Ohio, recently reported that company tire plants in five states are prepared to supply tubeless tires for new automobiles should manufacturers decide to adopt them as standard equipment. A substantial portion of the company's $30,000,000 plant expansion and improvement program for this year, Mr. Richardson said, has been allocated to increase tubeless tire production. Goodrich was the first company to introduce tubeless tires and has been granted six patents covering the tire's basic features.

National Plastics Organized

Allan J. Levin

Allan J. Levin has resigned his position with the Swan Rubber Co. to assist in the organization of the National Plastics & Chemicals Corp. of Bellevue, Ohio. Ernest Kirtz has been elected president of the new company with Mr. Levin as vice-president and general manager. Leonard Kirtz has been named secretary-treasurer. The company intends to provide custom servicing for the plastics industry in compounding both virgin and scrap materials. The company also intends to offer services relative to color blending, the mixing of chemicals and in the actual manufacture of chemicals. Complete laboratory facilities will be available in a plant equipped with modern machinery and equipment. National Plastics hopes to be in production by November 1.

Building Petrochemicals Plant

Sinclair Chemicals, Inc., New York, N. Y., has started construction of a petrochemicals producing plant at its Marcus Hook, Penna., refinery. The plant will have an annual capacity of 18,000,000 gallons of pure aromatic hydrocarbons, including toluene, xylenes and paraxylene, which will be supplied to the chemical and allied industries for the production of plastics, synthetic fibers, paints, medicinals and other chemical products. The plant will include a Udex unit which will process 2,300 barrels of selected catalytic gasoline fractions a day as well as an installation to produce 10,000,000 pounds of paraxylene a year. The feed stock for the entire petrochemical operation will come from the company's catalytic reforming unit now being completed at Marcus Hook.

Receives Government Loan

Spencer Rubber Products of Manchester, Conn., has received a direct loan from the Small Business Administration, Washington, D. C., in the amount of $100,000. Spencer Rubber Products produces a line of mechanical goods, including automotive and aircraft specialties, sponge rubber goods, stationers' goods and miscellaneous specialties.

New Chemical Unit on Stream

The maleic-anhydride-fumaric acid unit in the new Moundsville, West Va. plant of the National Aniline Division, Allied Chemical & Dye Corp., is now on stream. The new unit is believed to be the world's largest and most efficient producer of maleic anhydride tablets and fumaric acid crystals. Last February the first unit of this plant was put into operation to produce aniline. National Aniline pioneered the commercial production of maleic anhydride at its Buffalo, N. Y. plant in 1933 and has since made many improvements in both the process and catalyst. The new Moundsville plant, located on a large tract alongside another Allied Chemical facility, incorporates the latest advances in engineering construction, equipment and instrumentation. Assured of an ample supply of basic materials from within the Allied Chemical group, it can be expanded quickly as market demand increases. It will supplement National's production of dicarboxylic acids and anhydrides at Buffalo. Expanded facilities for these chemicals are required because of their rapidly increasing use in paints, plastics, plasticizers and polyester resins.

FFC Announces New Polymer

The Federal Facilities Corporation has announced that the X-number X-764 has been assigned to a cold black masterbatch in which the base polymer is a copolymer of butadiene and vinyl pyridine. X-764 is described as follows: "20 parts medium abrasion furnace black, plus 100 parts base polymer—approximately 8.0% bound vinyl pyridine, sugar-free iron activated, fatty acid soap emulsified, 41°F. reaction temperature, 85% conversion, carbamate short-stopped, staining stabilizer, acid coagulated. Mooney of base polymer approximately 20 ML-4 at 212°F." Due to the low Mooney viscosity of this polymer it will be packaged in crumb form in polyethylene-lined fiber drums, approximately 70 pounds of masterbatch per drum. The purchase price of X-764 will be 38c a pound, plus the applicable uniform freight charge. A production run is to be scheduled in the near future.

New Bibliography Available

The Library of the Division of Rubber Chemistry, American Chemical Society, University of Akron, Akron 4, Ohio, has announced the availability of another in its series of bibliographies. The latest, No. 17, is entitled "Abrasion Testing of Natural and Synthetic Rubbers." Mimeographed copies of the 45-page bibliography may be obtained on request to the Rubber Division Library.

Firestone Estate $3,091,715

Russell A. Firestone, son of the late Harvey S. Firestone, left a gross estate of $3,739,969 and a net of $3,091,715 when he died on December 12, 1951. The principal asset consisted of 54,448 Firestone Tire & Rubber Co. common shares appraised at $3,266,880. The principal beneficiaries are his wife and two sons.

Named Exclusive Sales Agent

William Tapper

William Tapper, dealer in rubber and plastics machinery at 30 South Broadway, Yonkers, N. Y., has been appointed exclusive sales representative in the United States for internal mixers produced by Werner & Pfleiderer, Stuttgart, Germany. These mixers are said to have approximately 25% greater capacity than comparably sized units of domestic manufacture, at a lower cost. William Tapper also represents G. Siempelkamp & Co. of Krefeld, in the United States. This firm produces a line of hydraulic presses. In addition, Mr. Tapper represents the Kleinewefers Co. of Germany in the United States, for that company's line of calenders and extruders.

New Brazilian Plant Inaugurated

Recent reports from Brazil disclose that the General Tire & Rubber Co., Akron, Ohio, inaugurated its new Brazilian factory in July. Located in the State of Rio de Janeiro, the plant is said to be one of the most modern in the world. At the outset, it will produce 100,000 automobile tires, 73,000 truck tires and 120,000 inner tubes a year. This is the second large-scale rubber development in Brazil in recent months. Previous event was the inauguration of the Dunlop Rubber Co.'s plant at Campinas in the State of Sao Paulo. Total output of tires in Brazil was estimated last year to be approximately 2,000,000 units a year.

Opens Southern Laboratory

Union Bay State Chemical Co., Inc., of Cambridge, Mass., has announced the opening of a development laboratory, sales office, and warehouse at 15 Gordon St., Greenville, S. C. The company will stress the development of products based on its own synthetic polymers at the new location. In addition, much closer contact will be maintained with manufacturers in the application of the company's current products. Roy Boggs, experienced textile chemist with much practical textile knowledge of Southern mills, will manage the development laboratory. Sales service will continue to be handled through Byrd Miller & Sons Co.

Purchases Chardon Rubber

Ball Brothers, Muncie, Ind., has announced the purchase of a controlling interest in the Chardon Rubber Co., Chardon, Ohio. The Muncie company, according to Edmund F. Ball, president, acquired a majority of the outstanding Chardon stock which had been held in escrow in a Cleveland, Ohio, bank since June 30 under a Ball option to buy. The amount of the transaction was not announced. The Chardon operation, Mr. Ball said, will be continued under its original name, Chardon Rubber, with no change in present management policies. The plant, employing 450 persons, produces mechanical rubber products comparable to the rubber goods Ball manufactures at its Muncie plants.

Three of the Chardon founders, V. M. Brediger, former president and chairman of the board, C. L. Shreiner, former director and executive vice-president, and H. L. Oplinger, former director and vice-president in charge of manufacturing, will continue to manage the company's affairs. At an organization meeting with representatives of the Ball interests following the stock purchase, Mr. Brediger was elected president, general manager and treasurer. Mr. Shreiner was renamed executive vice-president and Mr. Oplinger was renamed vice-president in charge of manufacturing. The three will also continue as directors. Of the seven new directors representing the Ball Brothers interests, Mr. Ball was chosen to be chairman of the Chardon board and A. M. Bracken, secretary and general counsel. The other new directors include W. C. Schade, executive vice-president and general manager of the Ball Company, J. W. Fisher, G. E. Myers and B. B. Holmes, all vice-presidents of Ball, and K. L. Menuez, general manager of the Ball rubber Products Division, Muncie.

Chardon was founded four years before Ball entered the mechanical rubber goods field. The Ohio firm also makes molded and extruded items with nearly three-quarters of its production in extruded lines for general industrial users, air conditioning manufacturers and the building supply industry. These products are supplied largely to midwestern and eastern markets. Chardon also has under construction now a new plant addition which will provide facilities for the manufacture of extruded vinyl plastics. This expansion will be completed under the new owners, it was announced.

Faultless Rubber Buys Building

T. W. Miller Jr., president of the Faultless Rubber Co., Ashland, Ohio has announced the purchase of a four-story building from the nearby F. E. Myers and Brothers. The building, which contains 35,000 square feet of floor space, will be used as a warehouse and shipping center and will be connected to the main Faultless Rubber plant by an overhead structure to facilitate the transfer of products by conveyor. According to Mr. Miller, the building was purchased in order to establish better shipping service and devote present warehouse space to the manufacture of several new products.

Heads Rubber Crops Section

Loren G. Polhamus assumed the responsibilities as Head of the Rubber Crops Section of the Field Crops Research Branch, U. S. Department of Agriculture, on August 1. He succeeds Dr. M. W. Parker who will devote full time to the leadership of the Weed Investigations Section. Mr. Polhamus has been associated with rubber plant investigations in the Department since 1923. From 1924 through 1931 he had charge of cultural and tapping experiments in Haiti. He also conducted detailed experiments with Hevea and many other introduced rubber bearing plants in Florida and with various native rubber bearing species in other sections of the United States. He has investigated methods of extracting rubber from native plants and has devised techniques for determining rubber content of plants. Mr. Polhamus assisted with the initiation of research to develop disease resistant strains of Hevea in Costa Rica and Panama and was responsible for the development of plans for the comprehensive surveys on potential rubber production in Latin America prior to World War II.

Since 1940 Mr. Polhamus has taken a leading part in the supervision of comprehensive research on rubber bearing plants within the United States and cooperative with the Latin American countries. He has served as Assistant Head of the Division of Rubber Plant Investigations since 1950. The work of the Rubber Crops Section includes studies on potential domestic rubber bearing plants and continuing research on Hevea supported by the Foreign Operations Administration in cooperation with Latin American countries.

Affiliates With Baker Perkins

John Marco, president of the Marco Co., Inc., of Wilmington, Del., has announced that the company is now affiliated with Baker Perkins, Inc., of Saginaw, Mich. The Marco concern will continue as a separate company with Mr. Marco as president. Research and manufacturing activities will be transferred to Saginaw, and the Wilmington facilities will be closed down. Customers and suppliers of the Marco Co. are requested to address all correspondence to the company at 1000 Hess Ave., Saginaw, Mich.

"You say you've had experience with vulcanizers?"

Patents Board Publication

Further encouragement to American industry to take advantage of the products of Government-sponsored technical research is the publication, announced recently by Dr. Archie M. Palmer, chairman of the Government Patents Board, of a volume listing 775 Government-owned inventions in the field of instrumentation with a brief description of each invention. Dr. Palmer pointed out that these inventions are ordinarily available to the public on a royalty-free license basis. In addition to the brief description or abstract of the invention, each listing includes the patent number, the title of the invention, the name of the inventor, and the Government agency administering the patent.

The 775 listings in this book, entitled "Instrumentation," are classified under eight sub-groups to help readers quickly locate items of particular interest. These sub-groups are: laboratory, scientific and engineering instruments; instruments for indicating, measuring and recording electrical quantities and characteristics; mechanical measuring and controlling instruments; optical instruments and lenses; surgical and medical instruments; X-ray and therapeutic apparatus; surgical and orthopedic appliances and supplies; photographic equipment and supplies. Also listed in the book are the addresses of the field offices of the United States Department of Commerce and of the Small Business Administration, conveniently located in various parts of the country, which may be consulted concerning the availability and use of these inventions.

The new book on "Instrumentation" (Order No. 111464) may be purchased at $2.00 a copy from the Office of Technical Services, United States Department of Commerce, Washington 25, D. C. (Room 6227, Commerce Building).

Detroit Plans October Meeting

The October 8th meeting of the Detroit Rubber and Plastics Group to be held at the Detroit-Leland Hotel, Detroit, Mich., will feature an address by H. H. Abernathy, assistant technical sales manager for the Rubber Chemicals Division of E. I. du Pont de Nemours & Co., Inc. Mr. Abernathy will speak on "Isocyanates and Their Reaction Products" during the technical portion of the meeting. The after dinner speaker will be Nick Kerbawy, business manager of the Detroit Lions football team. He will speak on the highlights of the 1953 championship season and will present a movie illustrating some of the thrilling instances that took place during the season.

Building New Research Unit

American Enka Corp., New York, N. Y., has announced that a construction contract had been let for the main portion of a new $1,000,000 research building adjoining its rayon plant at Enka, North Carolina. Work on the structure will begin at an early date. Representing a step forward in the company's continuing emphasis on research, the new plant will be designed to permit construction of additional units as required.

American Enka Appointments

American Enka Corp., New York, N. Y., has announced several promotions and appointments in its recently created Research and Development Division and in the General Engineering Department of the Manufacturing Division. The following new department heads were named in the Research and Development Division: Dr. G. I. Thurmond to be assistant director of research in charge of the Synthetic Polymer and Fundamental Chemical Research Department; F. B. Breazeale to be assistant director of research in charge of the Physical and Applied Rayon Research Department, and O. E. Herzog to be assistant director of research in charge of the Textile Research Department. Dr. James P. Parker was appointed leader of the Physical Section in the Rayon Research Department. In the Manufacturing Division, A. L. Jackson, was promoted to assistant director of engineering. In his new capacity, he will assist the director of engineering in the development of programs relating to the company's engineering activities; will coordinate activities of the various sections of the general engineering department, and will be responsible for liaison with the research and development division.

McCammond Joins Dewey & Almy

Appointment of Donald B. McCammond as assistant to the vice-president and general sales manager was announced recently by the Dewey and Almy Chemical Co., Cambridge, Mass. George W. Blackwood, vice-president and general sales manager, also appointed Paul Y. Clinton a member of the administrative sales staff for specific assignments on sales analysis. Mr. Clinton was graduated from Boston College with a B. S. degree in business administration in 1952 and from Harvard Business School with a master's degree in June. Mr. McCammond, former eastern manager of public relations for the Monsanto Chemical Co., was graduated from Northeastern University Law School in 1937. A member of the Massachusetts bar, he served for several years as a political writer on the staff of the Christian Science Monitor. He is a member and former director of the Public Relations Society of America, a trustee of the Judge Baker Guidance Center, Boston, and a member of the Boston Press Club.

Expands Research Center

Stauffer Chemical Co., New York, N. Y. announces a further expansion of its Richmond Research Center, one of four Stauffer research laboratories, located adjacent to the company's Richmond, Calif., plant. The new construction will add 4,000 square feet to the present building by year's end, and will provide space for bench scale pilot plant facilities and additional research activities, as well as relieve overcrowding in the present building. Approximately 75% of the new space will be utilized as laboratory space and 25% will be office space. This expansion represents an expenditure in excess of $100,000 and comes upon the heels of an addition to the building early last year of 2,400 square feet, Stauffer said.

Appointed Technical Director

Dr. Stuart Blake Row

O'Sullivan Rubber Corp., Winchester, Va., has announced the appointment of Dr. Stuart Blake Row as technical director in charge of all plastics and rubber research, development and engineering. Dr. Row received his bachelor's and master's degrees in chemical engineering from Virginia Polytechnic Institute and holds a doctorate in chemical engineering from Ohio State University. Following a research fellowship at Virginia Polytechnic in 1931-32, he served as instructor and an assistant professor at Virginia Polytechnic and Ohio State. Subsequently, he was named professor and head of chemical engineering at Southwestern Louisiana Institute. A research chemical engineer with the American Viscose Corp. at Roanoke, Va., since 1942, Dr. Row's final position before his most recent appointment was assistant technical superintendent. He is the author of numerous articles published by Virginia Polytechnic and has presented papers before the American Institute of Chemical Engineers and the Virginia Academy of Science. He is a member of the AICE, ACS, the Virginia Academy of Science, Sigma Xi, Phi Kappa Phi, Phi Lambda Upsilon, and Tau Beta Pi.

BDSA Appoints Morrison

The appointment of Carl G. Morrison of Baton Rouge, La., as Director of the Chemicals and Rubber Division, Business and Defense Services Administration, U. S. Department of Commerce, was announced on August 31, by BDSA Administrator Charles F. Honeywell. Mr. Morrison is on loan from the Enjay Co., Inc., New York, N. Y., to the BDSA under a rotation system whereby the services of outstanding businessmen and industrialists are provided without cost to the Government for periods of six months or longer. As Director of the Chemicals and Rubber Division, he succeeds Harold H. Smith of Concord, California, who has returned to the Dow Chemical Co., after having served as the Division's Director since last March.

Building Oxo Chemicals Unit

Construction of a new unit to produce more than 60,000,000 pounds of chemicals per year by the Oxo process at the Texas City, Texas, plant of the Carbide and Carbon Chemicals Co., is nearing completion according to the company. This new unit at the Texas City plant is one of the largest in the world employing the Oxo process for the synthesis of chemicals. Using the extremely high pressure reactions of the Oxo process, a large family of new alcohols, aldehydes, and acids will immediately be added to the more than 400 synthetic organic chemicals now produced on a commercial scale by Carbide and Carbon. At the present time commercial quantities of seven new Oxo chemicals are already being produced in pilot plant quantities at the South Charleston, West Va., plant of Carbide and Carbon. With the initial operation of the new large-scale commercial unit the manufacture of many of these will be transferred to Texas City. Production of iso-octyl alcohol, primary decyl alcohols, and primary tridecyl alcohols is planned for the initial operation of the unit which is scheduled to start in late October.

Acquires New Jersey Company

The property and business of the Natural Products Refining Co., Jersey City, N. J., acquired by the Pittsburgh Plate Glass Co. under a plan of reorganization on August 17, have been transferred to the Columbia-Southern Chemical Corp., a wholly-owned subsidiary of Pittsburgh Plate. The facility produces bichromates and related products and will be known as the Jersey City plant of Columbia-Southern. The firm anticipates no immediate change in sales policy on sale of products from this plant. Columbia-Southern anticipates expansion of the firm's extensive research and technical service programs to include the chemicals produced at the New Jersey operation. Robert E. Wilding has been named works manager of the plant which consists of 33 buildings covering about five acres of land. Associated with Columbia-Southern since 1943, Mr. Wilding had served as chief process engineer for the firm until his present assignment.

Goodrich Acquisition Final

Final arrangements for the acquisition of the Sponge Rubber Products Co. by the B. F. Goodrich Co. were completed on August 13. In payment for Sponge Rubber, Goodrich issued 179,400 shares of its common stock, worth approximately $17,700,000 at recent market prices. The business will be operated as the B. F. Goodrich Sponge Products Division. Frederick M. Daley, former president of Sponge Rubber Products, and William R. Todd, vice-president, will retain their positions. The new Goodrich division has plants in Shelton and Derby, Conn., and Fall River, Mass. A Canadian subsidiary is located at Waterville, Que. On December 31, 1953, Sponge Rubber Products listed consolidated assets of about $17,500,000. Sales in 1953 totaled about $32,500,000.

Goodyear Tubeless Tires

Goodyear Tire & Rubber Co. has announced a complete line of tubeless tires evolved from an entirely new concept of design and construction. In the passenger car field, the new tire is priced the same as the firm's conventional tire and tube combination. In all types, the new tubeless tire is said to be revolutionary in principle, since it employs no sealant and depends upon an airtight cord fabric to retain the air. In other words, the company states, the body of the tire is designed primarily to hold air rather than to hold a tube. The tubeless tire has a new, flatter tread, expected to provide up to 12% greater mileage. The company emphasizes that the new tubeless tire is not merely an improvement on something old, but "is an entirely new product developed from the ground up." To do this required some five years of extensive research and an investment of $5,000,000 in machinery and equipment.

The entire program hinged upon the company's "3-T" process for stabilizing tire cord. This triple-tempering action, involving the elements of tension, temperature and time, pre-stretches the cord, either nylon or rayon, thus preventing tire growth, carcass separation and consequent air loss. Most important, however, in the tubeless construction, is the way in which the 3-T process seals the tire against loss of air. This is achieved by a special treatment given to each of the cords in the tire fabric, making the cords nearly impervious to transmission of air. The Goodyear tubeless tire is already on the market in the firm's passenger car line. Limited quantities of airplane tubeless tires are being released for military use, and even tubeless tires for wheelbarrows also are available. Truck and bus units are currently undergoing rigorous tests and probably will not reach the market for another year or more.

Cyanamid Forms New Sales Group

American Cyanamid Co., New York, N. Y., has announced the formation of a Petrochemicals Department sales organization to handle most of the products of the company's Fortier plant in New Orleans, La. The new sales group, headed by Dr. V. E. Wellman, manager of the Petrochemicals Department, will handle sales and sales development of acrylonitrile and certain other industrial chemicals made at the Fortier plant. Named to posts in the group are: Dr. A. J. Weith, assistant sales manager; George C. Voss, district sales manager in New York, and Frank W. Miner, district sales manager in Chicago.

Marketing Extra Soft Heels

The Shoe Products Sales Division of the B. F. Goodrich Co., Akron, Ohio, is now marketing an extra soft heel for women's shoes. A companion product to the extra soft heel for men's shoes, introduced earlier this year, the new extra soft heel is said to outwear two pairs of ordinary heels. Made of a special rubber, the light-weight heel is also said to offer extra wearing comfort.

Comes Elected Vice-President

Donald A. Comes

Farrel-Birmingham, Inc., Ansonia, Conn., has announced the election of Donald A. Comes as vice-president. He will also continue to hold his present position as general sales manager. Mr. Comes has been connected with Farrel-Birmingham since 1922. He was a sales representative in the New Jersey territory for a number of years, with an office at Hackensack, and was particularly active in developing the use of Banbury mixers in the rubber, plastics, linoleum, paint and other industries. In 1943 Mr. Comes was transferred to the Farrel-Birmingham main office at Ansonia, as manager of the Banbury Mixer Department. In 1946 he was promoted to the position of assistant general sales manager and in 1953 was named general sales manager.

Studying Merger Proposal

The directors of W. R. Grace & Co. and of the Dewey and Almy Chemical Co. have informed their respective shareholders of a proposed merger, it was announced recently by J. Peter Grace, Jr. and Hugh S. Ferguson, the companies' presidents. The merger would provide Dewey and Almy shareholders with one share of W. R. Grace & Co. common stock for each share of Dewey and Almy stock. Methods of accomplishing the merger are being studied by both companies so that a plan can be presented to shareholders as soon as possible for their approval. Mr. Grace and Mr. Ferguson stated that if the plan is consummated, Dewey and Almy will continue to operate as an autonomous unit with its headquarters at Cambridge, Mass., with no change expected in the personnel or in the policies under which they work.

Reduces Super Cordura Price

A reduction in the price of 1650 denier and 1900 denier "Super Cordura" high tenacity rayon yarns from 67 to 64c a pound was announced on September 1 by the Textile Fibers Department of E. I. du Pont de Nemours & Co., Inc. Super Cordura was first offered to the rubber industry one year ago. Strong demands for this fiber has kept production at a high level and contributed to the reduction in price, the company said.

Latex Emulsion Paint Colors

A new line of "stir-in" pulp colors recommended for use in latex emulsion paints of all types is being offered by the Pigment, Color and Chemical Division of the Sherwin-Williams Co., Chicago, Ill. These pulp colors are homogeneous mixtures of pigment and water which will not settle out during normal storage. They are designed for cases where it is desired to save the cost of grinding the pigment or grinding facilities are not available. Latex emulsion paints can be made satisfactorily with the "stir-in" pulps by means of a simple slow-speed paddle type mixer or a high-speed propellor type agitator. They are recommended by the company for all types of emulsion finishes, and have been used with butadiene-styrene, polystyrene, acrylic and polyvinyl acetate polymers. The line includes three types of Hansa Yellow (10G, G and M shades), Toluidine Red, Naphthol Red Light, Alizarine Red, Pigment Green B and Phthalocyanine Blue. These colors are sufficient to obtain the shades desired by most manufacturers. They have been chosen because they are the lowest cost pigments which have the desired good light resistance, hiding, alkali stability and other properties as well as the proper shades. They contain only enough surface active agent to aid in wetting the pigment and dispersing it into the emulsion vehicle. Therefore, they will not affect the washability of the final paint. The "Stir-in" advantage of these pulps is based primarily on physical condition, not on surface active agent.

Brazilian Rubber Goods Imports

According to a clarification of policy, applications for approval to import rubber goods into Brazil usually are refused by the Brazilian Executive Commission for Rubber Defense. Before exchange commitment certificates are purchased for importation of rubber and rubber goods, prior approval of the Commission is required. The Commission examines applications for importation of rubber goods in the light of national requirements and the capability of the domestic industry to satisfy demand. About 90% of requirements for manufactured rubber products are now reported to be met by domestic industry. However, each application is judged on its own merits, as variable market and industry developments occasionally may give rise to conditions in which local supply cannot meet consumer demand.

Re-Enters Consulting Field

Philip H. Rhodes, technical director of the Clopay Corp., has announced his resignation effective October 1 in order that he may re-enter the consulting field. Mr. Rhodes has announced that his new address will be 4354 Hamilton Ave., Cincinnati 23, Ohio, and has indicated that he will specialize in raw materials, raw material sales development and product development for the plastics industry. Mr. Rhodes is well-known in the plastics industry for his work in the vinyl resin field, particularly with regard to extruded, coated and cast products and has an earlier broad background in the phenolic field.

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LOS ANGELES NEWS

Lee-Tex Rubber Products Corp., of California, said to be the nation's largest exclusive manufacturer of toy balloons, will occupy its new $350,000 plant in Gardena, California, this fall according to President H. W. McConnell. The Lee-Tex line of toy balloons and other dipped rubber inflatable toys is sold in nearly all national chain stores and is used by some of the country's major companies as advertising-imprinted premiums.

The new building will cover 58,000 square feet and will include a continuous 300 foot production line and 17 separate departments capable of producing more than half-a-million Lee-Tex toy balloons a day. In addition to executive offices, the building will be headquarters for the sales staff and national sales representatives under direction of Harry Sugerman, Director of Sales. It will also offer a merchandise display room, research and technical laboratory, conference room and cafeteria for the 150 to 200 employees required to handle normal production.

This marks another step in the growth of Lee-Tex California, founded in Los Angeles in 1947 and now shipping toy balloons to many parts of the world. Such progress is based on Lee-Tex adherence to high quality production, even to the extent of designing and building certain of their own machinery, and to Lee-Tex leadership in the addition of new styles and processes.

In 1949 Lee-Tex acquired the rights for the patented Iler-Smith Process of full-color, photographic reproduction on balloons, now marketed under the trade name of "Exquis-Art." These and other balloons feature famous name characters such as "Beany," "Woody Woodpecker," "Hopalong Cassidy" and others.

President McConnell, who has had 30 years' experience in the balloon industry, is joined in this expansion program by A. Magid, the firm's secretary-treasurer, former president of Cleveland Merchandising Co. Lee-Tex is presently located at 321 East Jackson Street, Los Angles 12, Calif.

The TLARGI Rubber Technology Foundation, sponsored by the Los Angeles Rubber Group at the University of Southern California, held an open house from 4:30 to 6:30 P.M. on August 31 and September 1 to acquaint contributors and others with the laboratories and other facilities. The Open House Committee was headed by Roy N. Phelan (Atlas Sponge Rubber).

Al Rawland, formerly plant manager of the Midland Rubber Corp. at Torrance, Calif., has been assigned duties with the International Division of the Minnesota Mining and Manufacturing Co. in England and France. He has been succeeded as Torrance plant manager by I. W. Adams, Jr.

G. O. Hunsinger, formerly associated with the National Electric Products Corporation at Ambridge, Penna., as a wire and cable engineer, has joined Western Insulated Wire at Los Angeles as executive engineer succeeding Herman Libkind.

Raymond H. Perkins, sales engineer for the Farrel-Birmingham Co., Inc., Ansonia, Conn., has been transferred from the New England territory to the West Coast as assistant to Paul Oliver, head of the company's Los Angeles office. A chemical engineer, Mr. Perkins was graduated from the University of Florida. He was employed by Rockbestos Products Corp. for six years as a chemist before he joined the Engineering Department of Farrel-Birmingham in 1941. He was transferred to the Rubber and Plastics Machinery Sales Division in 1948, and since then has represented the company in New England.

The Southern California Section of the Society of Plastics Engineers, Inc., will sponsor an industrial conference coincident with the first American Society of Tool Engineers' Western Industrial Exposition and that society's national convention in Shrine Auditorium and Exposition hall in Los Angeles next March.

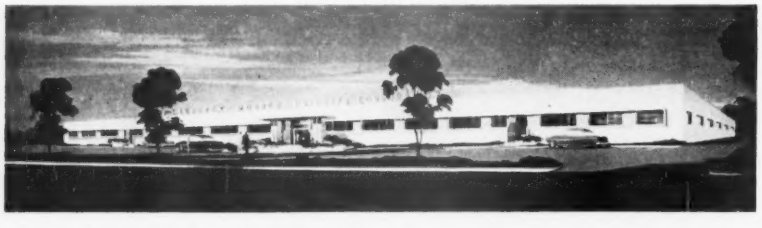
All who attended the Summer Outing of the Los Angeles Rubber Group were impressed with the variety of functions and general activities provided by the various committees in charge of the outing headed by F. C. Johnston (Caram Mfg.). The following members are the 1954 winners in the respective activities noted:

Ping Pong—J. Arensmeyer, Dickson Sheppard, Ed Wilson and Floyd Price; *Tennis*—B. Hodowski, Barry Everett, Milt Stotz and Jesse Steel; *Shuffleboard*—Bob Bowen, Don Montgomery, Bud Burson and Charles Sickles; *Croquet Ball Lag*—Romie Hromatka, Al Marone and Bill Layne; *Horseshoes*—Al Federico, Mac McKash, Leonard Boeller and Yates Van Patter; *Bean Guessing Contest*—Artie Favenza and Harry Trechter; *Darts*—Bob Kavish, Chuck Finley and M. A. McDonald.

In the Golf Tournament, the following members won in the events noted: *Low Gross*—Skip McMahon and J. Meyer; *Low Net*—J. Ritchie and M. Churchill; *Long Drive*—J. Hoefle; *Nearest-to-Pin*—W. E. Fields; *Longest Putt*—Bert Toevs; *Blind Bogey*—A. P. Paulk and Dan Buddick; *Blind Hole High Score*—C. Anderson and H. Lipkind; *Lowest Number of Putts*—C. Froude.

The baseball game was won by a team of "Vendors" with Dick Maxwell and Del Shade as umpires. Players on the winning team included Bill Pease, Pat Gleason, Dean Daniels, J. Bearce, Bob Reese, A. Denerin, C. Ashcroft, P. Joehnig, Bert Biheller, Dick White, Bert Dougherty, and Bob Mikuto.

Raymond H. Perkins
Joins Los Angeles office of Farrel-Birmingham



Shown above is the beautiful $350,000 plant in Gardena, California, due for completion this fall as new home for manufacture of Lee-Tex California balloons. There will be 58,000 square feet of space, including a continuous 300 foot production line and 17 separate departments capable of producing over half-a-million Lee-Tex toy balloons a day.

Introduces Rayon Fire-Flock

Cellusuede Products, Inc., Rockford, Ill., has announced ten new ultra-brilliant flock colors in fluorescent hues, which are easy to apply with all types of equipment without "pilling" or "balling." The new flock, now being marketed under the trade name of "Fire-Flock," is especially processed from the same viscose rayon as the company's regular line of rayon flock and is readily adaptable to a wide range of uses.

Coming next month—first in a series on the European rubber industry!

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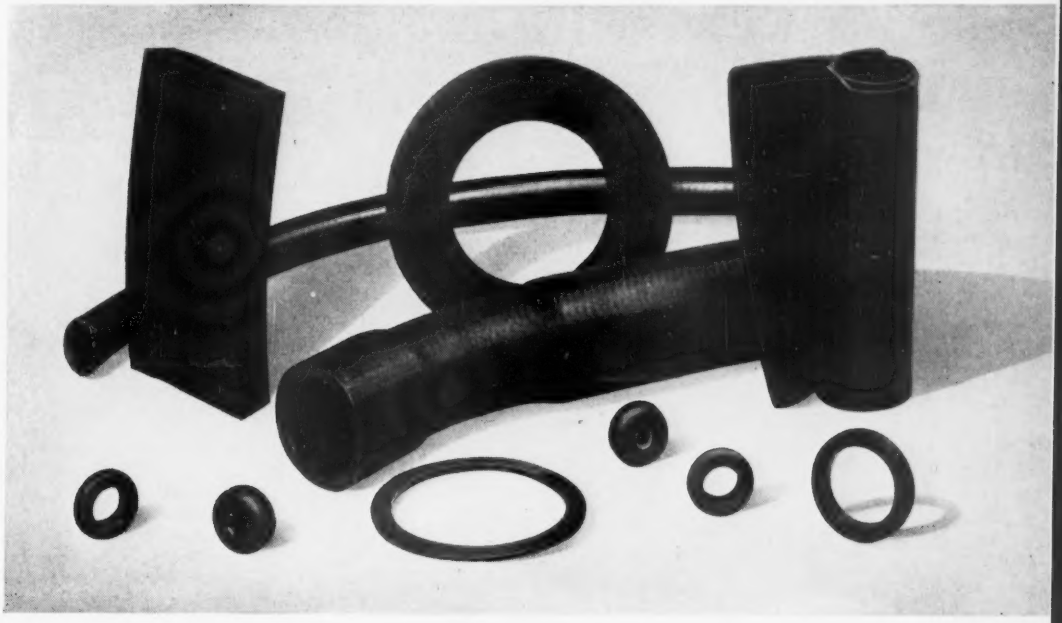

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CANADIAN NEWS

DuPont Co. of Canada, Ltd., recently started construction of a $1,500,000 research laboratory at Kingston, Ont. It is the first building of a five-unit research center and is designed for development, basic research and investigation of new processes and products. This project represents the beginning of what will be a sustained, independent program of basic industrial research.

Head of the new laboratory will be Owen C. W. Allenby, an organic chemistry graduate of the Universities of Toronto and McGill. The first laboratory is expected to be completed by the fall of 1955 and will employ 80 persons.

This first building will have a floor area of 30,000 square feet and will include semi-works facilities, 12 two-man chemical research areas and library, machine shop and administration areas. An air flow of more than 2,500,000 cubic feet per hour will provide ventilation of laboratory bench surfaces for safe handling of toxic materials. Compressed gases will be supplied by remote control and the semi-works area of the building is windowless to achieve dust-free atmosphere and uniform light intensity.

The Sixth Canadian High Polymer Forum, devoted to all aspects of High Polymer Chemistry, will be held at Ridley College, St. Catherines, Ontario, on Thursday and Friday, April 14 and 15, 1955. There will be an invited address by a well known scientist in the field. Papers are invited for the general program. These may be unpublished discussions, reviews of timely topics, or shorter original contributions. The papers may be released for publication in journals of the authors' choice upon request. Offers of contributions to the program should reach the Program Chairman, Dr. H. L. Williams, Research and Development Division, Polymer Corp., Ltd., Sarnia, Ont., as soon as possible, and a confirmation with two hundred word abstract not later than February 15, 1955. Information regarding accommodation may be obtained from D. S. Fensom, Ridley College, St. Catherines, Ontario. General information may be obtained from the secretary-treasurer, Dr. D. G. Ivey, Department of Physics, University of Toronto, Toronto, Ont.

Reichhold Chemicals, Ltd., will construct a new $750,000 plant near Montreal for production of phthalic anhydride. Demand for phthalic has shot up in recent years with sharply increased demands for high quality enamel finishes of which it is an important constituent. It is a plasticizer material as well, used in making vinyl film and sheeting plastics. "The new Quebec plant will make Canada virtually independent of foreign sources of phthalic anhydride," states Henry H. Reichhold, chairman of the board of the parent Reichhold Chemicals, Inc., New York, N. Y.

Leo E. Ryan, president of Barringham Rubber and Plastics, Ltd., has announced that the company name has been changed to Monsanto Oakville, Ltd. Monsanto Oakville, operating as a subsidiary of Monsanto Canada, Ltd., manufactures vinyl film, sheeting, and coated fabrics. Facilities consist of seven buildings, occupying a twenty acre site in Oakville, southern Ontario. The Oakville company was purchased by Monsanto Canada in 1952 and since then has concentrated on product formulation, design and new applications in vinyl fabrics.

Dunlop Tire & Rubber Goods Co., Ltd., has started a multi-million dollar expansion program at Whitby, Ont., which will include immediate construction of a new "Pillofoam" cushioning plant, J. P. Anderson, president and general manager recently announced. The new 100-by-660-foot plant will be the second Dunlop factory located on the company's 56-acre Whitby property. The plant is to be built immediately south of the new truck and passenger car tire plant which is now under construction and scheduled for completion early in 1955.

Two new appointments in the sales organization of Seiberling Rubber Co., of Canada, Ltd., Toronto, have been announced by A. P. Acheson, vice-president in charge of sales. R. J. Gignac, Montreal, Quebec, has been appointed Eastern Division sales manager and J. B. Preston, Toronto, Ontario, has been named Western Division sales manager. The appointments are the result of a decision to divide the company's distribution into two divisions to further strengthen service to branches, salesmen, distributors, warehouses and dealers.

N. F. Patterson was appointed a director of Monsanto Chemicals, Ltd. Mr. Patterson, who joined Monsanto in 1946, became works manager at Ruabon in 1947, and in July 1949 was appointed general manager of production, with responsibility for all the production operations of the company. He is a director also of Monsanto (Soil Conditions) Limited and Monsanto Plastics Limited, subsidiary companies of Monsanto Chemicals Limited.

I. W. T. MacPherson has been appointed general manager of the Tire Replacement Division of the B. F. Goodrich Rubber Co. of Canada, Ltd. A native of Belleville, Ontario, Mr. MacPherson joined Goodrich in 1933 and has extensive experience in all phases of the Tire Division. He was appointed Toronto District Manager in 1945 and Eastern Zone Manager in 1953. His new headquarters will be at the Goodrich head office in Kitchener, Ontario.

Landers Promotes Siegmann

John C. Siegmann has been elected secretary and treasurer of the Landers Corp., Toledo, Ohio, to fill the vacancy created by the recent retirement of Percy E. Roper. Mr. Siegmann has been vice-president in charge of purchasing, labor relations and scheduling. He has spent his entire business career of 28 years with Landers, starting with the company in 1926 as a baler in the factory and later as office boy. Progressively, he was put in charge of accounts receivable, bookkeeping and inventory control. He installed the first formal cost accounting system for the company. He was elected assistant treasurer in 1935, made general purchasing agent in 1941, elected as a director of the company in 1949, and vice-president in 1952. In addition to his new responsibilities as secretary, treasurer and director of the Landers Corp., Mr. Siegmann will also have charge of all purchasing, labor relations and scheduling for the firm.

Mr. Roper has spent the greatest part of his business career with Landers. He came to Toledo in 1916 as a public accountant and began in 1917 to serve in various financial capacities with the Landers Brothers Co., Toledo Auto Fabrics Co., and American Buckram, Weaving and Finishing Co., businesses in which Ralph A. Landers was interested from a financial and management standpoint. The three firms were consolidated in 1928 to form the Landers Corp. and Mr. Roper was elected treasurer and named a director. In addition to these duties, he was elected secretary of the corporation in 1944.

Purchases Zinc Properties

Eagle-Picher Co., Cincinnati, Ohio, has purchased from Calumet & Hecla, Inc. its zinc properties in the Wisconsin-Illinois field comprising leaseholds on approximately 3650 acres of land, as well as a mill, supplies and materials. Calumet and Hecla, Inc. has operated these properties continuously since 1948 when they were acquired from a development subsidiary. This acquisition will more than double Eagle-Picher's zinc ore reserves in the Wisconsin-Illinois area. During 1953 Eagle Picher purchased the mining properties and equipment of the Bilharz Mining Co. and the Gordon mine of American Smelting & Refining Co. pursuant to its policy of increasing domestic reserves of zinc ore whenever favorable opportunities arise. Its chief mining activities presently are in the Tri-State District (Missouri, Kansas, Oklahoma), and in Mexico.

Mailman Corp., Ltd., of Montreal, Canada, has confirmed a report from Peterborough, Ont., that it has acquired R. Neill, Ltd., which operates a chain of 16 shoe stores in Ontario, through the acquisition of all of the 1,000 outstanding shares of the company. Price was not disclosed. The stores will continue to be operated as Neill's Shoe Stores by Mailman Corp., which includes among its holdings the British Rubber Company, Montreal Shoe Stores Ltd., and Huron Slipper Company.

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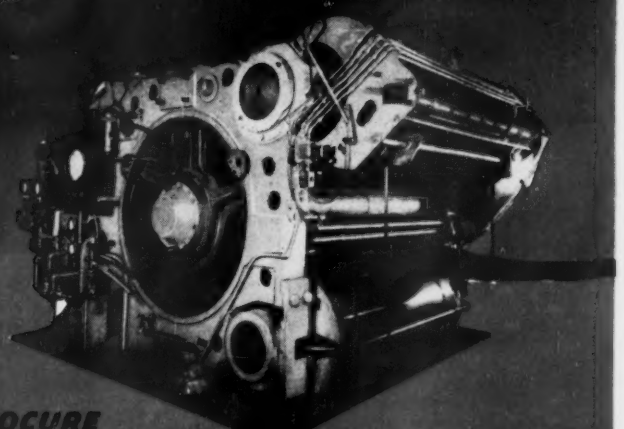

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OBITUARIES

Harry B. Burley

Harry Benjamin Burley, president and treasurer of the Boston Insulated Wire & Cable Co., Dorchester, Mass., died at his home in Brookline, Mass., on August 22. He was 88 years old. Born in Epping, N. H., Mr. Burley was graduated from the Massachusetts Institute of Technology in 1890. He was civil engineer for Nashua, N. H., from 1890 until 1893 when he became engineer for the Factory Mutual Insurance Co. of Boston, Mass., serving as its factory inspector throughout the country for twelve years. In 1905, Mr. Burley founded the Boston Insulated Wire & Cable Co., and was president and treasurer until his death. In 1916, he formed the Boston Insulated Wire & Cable Co., Ltd., in Hamilton, Ont., as a subsidiary company which he also served as president and treasurer. Recognized as a pioneer in the manufacture of a variety of special wires and cables, Mr. Burley was also a past director of the Dorchester Savings Bank and the Dorchester Board of Trade. He was a charter and life member of the University Club of Boston and charter member of the Boston Chamber of Commerce. He was also a member of the American Society of Civil Engineers and the American Standards Association. He served on the Committee on Relation of Government to Industry in the National Association of Manufacturers and was active in the Alumni Association of Dartmouth College and the Alumni Council of M.I.T. He is survived by his wife and three sons, two of whom, Joseph C., and Harry B., Jr., are actively associated with the company.

Robert T. Vanderbilt

Robert Thurlow Vanderbilt, president of the R. T. Vanderbilt Co., Inc., died on August 13 of injuries suffered the previous day when he was hit by a truck while crossing a New York City street. He was 69 years old. Born in Brooklyn, in 1885, Mr. Vanderbilt joined the Perkin and Goodwin Co., chemical dealers, while still a young man and became interested in the use of clay in paper manufacturing. In 1916 he formed his own company to distribute the output of the Georgia Kaolin Co., of Macon, which operated a kaolin refining plant. This was the beginning of the R. T. Vanderbilt Co. In 1919, he was joined by Dr. A. A. Somerville, who organized the Rubber Department and brought the company into the rubber field. Mr. Vanderbilt belonged to the Union Club and the Cloud Club, both of New York, and the Fairfield Country Club in Connecticut. His hobbies were golf and the raising of flowers and trees. Surviving are three sons and a sister. Funeral services were held on August 16 at his home in Green Farms, Conn.

Paul W. Shafer

Paul W. Shafer, Republican Representative in Congress from the Third Michigan District since 1937, died on August 17 at Walter Reed Hospital in Washington, D. C. He was 61 years old. In recent years, Representative Shafer devoted much of his time to synthetic rubber legislation. He was the author of legislation under which the government continued in the development and operation of synthetic rubber production after World War II. Last year, he was the author of synthetic rubber disposal legislation and led the successful fight for its enactment by Congress. In May of last year, Mr. Shafer, recognized as a leading Congressional authority on the synthetic rubber industry, was the Congressional advisor on the United States Delegation to the Tenth International Rubber Study Group conference in Copenhagen, Denmark. Before entering politics, Rep. Shafer was a newspaper reporter and editor. In 1929, he was elected municipal justice in Battle Creek, Mich. He was re-elected in 1935 and served until his election to Congress in 1936. He served in Congress on the District of Columbia and Post Offices Committees, and became a member of the Military Affairs Committee, continuing as a member of the House Armed Services Committee when the military and naval groups were combined.

Joseph M. Brisebois

Joseph M. Brisebois, manager of market research for the Tire Division of the U. S. Rubber Co., died on August 4 after a brief illness. He was 58 years old. Mr. Brisebois had been associated with the company since 1929, and had many years of experience in the fields of distribution planning, sales forecasting, sales research and analysis, and business development and marketing. He was well known in the market research field and was a member of the American Marketing Association, the American Management Association, and the American Statistical Association. After graduation from Bowdoin College, Mr. Brisebois went into business for himself. He later joined DuPont and became manager of the Sales Records Department of the Cellophane Division. Surviving are his wife and a brother.

Louis G. Davenport

Louis G. Davenport, retired treasurer of the Laurel Co., died of heart failure on July 23. He was 71 years old. Born in Morristown, N. J., Mr. Davenport attended the Morristown public schools. He later worked for the Mattson Rubber Co., Reliance Rubber Co., and the Uniflex Rubber Co., and in 1929 joined the Laurel Co. He retired in 1953 after having served as treasurer for a number of years. Mr. treasurer for a number of years.

F. Floyd Myers

F. Floyd Myers, owner and manager of the F. F. Myers Co. of Akron, Ohio, died of a heart attack on August 16 while watching television at his home in Akron. He was 63 years old. Mr. Myers had been associated with the rubber industry for 45 years and for the past 25 years his company has been Akron representative for the United Carbon Co. Before he formed

his own business, Mr. Myers was associated with the Goodyear Tire & Rubber Co., A. Schrader's Son, and Barnwell & Co. In addition to serving United Carbon in the Akron area, the F. F. Myers Co also acts as a fabric broker. In his will, Mr. Myers left an estate estimated at $330,000 to his wife and three children. He bequeathed his business to two sons, Frederick F., Jr., and James Albert, both of whom have been active in its management.

Dow Corning Silica Soot

"Silica soot", an almost chemically pure silicon dioxide with a particle size of only 10 to 20 millimicrons, is now being manufactured semi-commercially for the first time in this country by the Dow Corning Corp., Midland, Mich. Identified as "Dow Corning Silica," it is produced by burning silicon tetrachloride in the presence of combustible gases, a process invented at the Corning Glass Works in 1933-35 by Dr. Frank Hyde, now of Dow Corning. Dow Corning Silica is said to exhibit a higher degree of purity (99%) and particle separation than silicas formed by precipitation processes. Individual particles are well defined and non-agglomerating, permitting the material's remarkable surface area and oil absorption properties to realize maximum effectiveness. It is easily dispersed in elastomeric compounds and in solvent, oil, or water-based systems. Its combination of unique properties suggest the use of Dow Corning Silica as a reinforcing filler for synthetic rubbers and plastics, a flatting agent and extender for protective coatings, a thickener for lubricating greases and as an additive in textile finishing. It is shipped in the form of fairly uniform, friable pellets that are essentially dustless and easy to handle.

Coming next month—first in a series on the European rubber industry!

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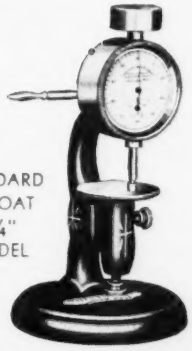

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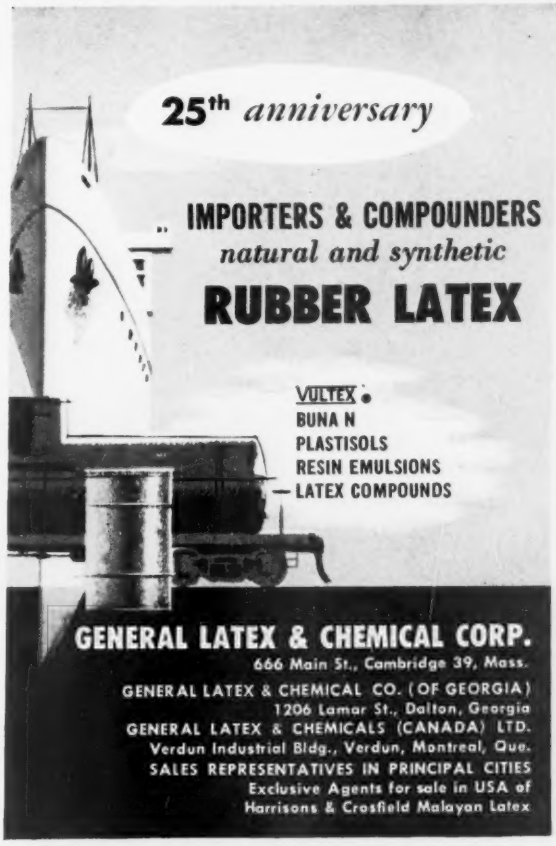

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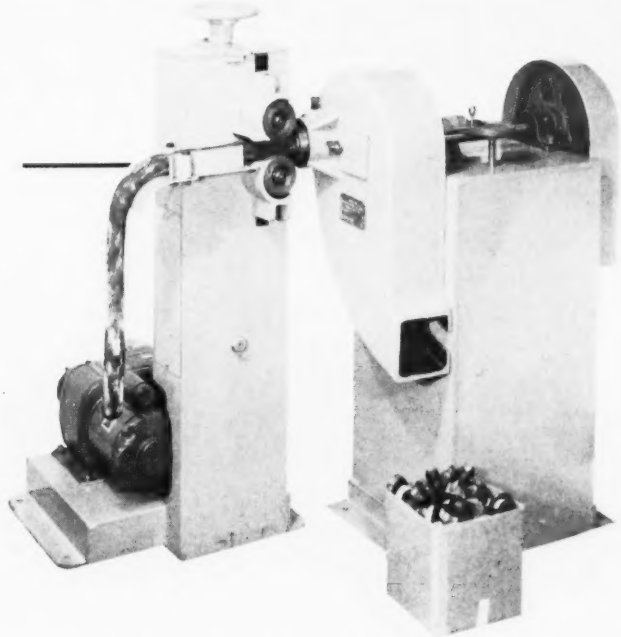

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This cutter provides a complete range of cutting speed to deliver from 100 to 1800 slugs per minute of extruded stock, ¼" to 3" in diameter. A spring loaded work stop, strong and easily adjustable, gives precise control of slugs in length from ⅛" to 4". Connected directly to the tuber, this versatile unit keeps production high, costs low. Write for specification data sheet.

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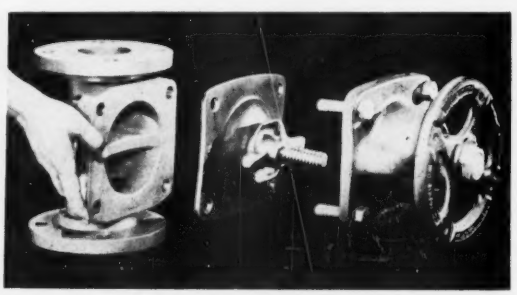
NEW GOODS

Uscolite Valve Body

A rubber-plastic valve body with a three-inch diameter, for use in corrosion-resistant and non-contaminating piping systems, has been developed by the Mechanical Goods Division of the U. S. Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y., in cooperation with the Hills-McCanna Co., of Chicago, Ill. The valve body is made of a styrene copolymer called "Uscolite," whose high chemical resistance and low moisture absorption keep the valve body from contaminating the materials being handled. Also announced was a line of three- and four-inch pipe fittings made of Uscolite. Both valve and fittings are of one-piece, homo-



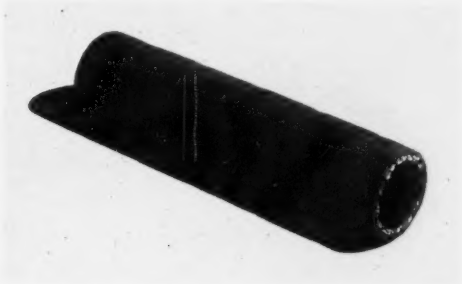
geneously-molded construction, having no welds or joints at points of stress. They are made to withstand the same working pressures and temperatures as the corresponding size extra heavy Uscolite pipe, which is available up to six inches in diameter. Working pressures range to 150 psi and temperatures to 170°F. Heretofore the largest Uscolite valve and fittings were of two-inch diameter. The increase in size is said to represent an increase in capacity of more than double that of a two-inch system. Shown above in an exploded view are, left to right, the rubber-plastic valve body, rubber diaphragm and valve bonnet.

Dur-Ace Plastic Pipe

A new corrosion-resistant, rigid plastic pipe has been announced by the American Hard Rubber Co., 93 Worth Street, New York 13, N. Y. Made of "Dur-Ace" plastic, the pipe is light in weight, odorless, tasteless and non-contaminating. Said to be resistant to all inorganic acids and alkalis, with the exception of a few strong acids, Dur-Ace maintains good strength rigidity and chemical resistance over a temperature range of —40° to 170°F. Its moisture absorption rate is low and it is suggested for such outdoor uses as buried water lines, crude oil, gas, brine and other lines. Dur-Ace pipe is supplied in sizes from one-half to two inches, in standard 20-foot lengths, with choice of two wall thicknesses: Extra Heavy Duty (IPS Schedule 80), and Standard (IPS Schedule 40). Fittings, flanges, nipples, etc., are also available of Dur-Ace with standard IPS threads. The pipe is easily threaded with standard pipe threading tools or machines. It can be bent in regular pipe forming equipment if heated first to soften it. Working pressures, depending on size and wall thicknesses, range up to 300 psi.

Revelation Air Hose

Hamilton Rubber Manufacturing Corp., Mead St., Trenton 3, N. J., is now producing a new, improved air hose on modern high-speed braiding equipment. This new "Revelation Air Hose" is made from high tenacity Cordura rayon cord which is thoroughly impregnated with a rubber cement and braided under tension on steel mandrels. The hose is light, flexible, and



furnished with a neoprene oil-resistant tube. Its high quality red cover resists extreme wear, abrasion and severe service conditions encountered in quarries, mines, foundries, car shops, shipyards, and contractors' work. Revelation Air Hose comes in standard lengths of 50 feet in ⅜-, ½-, ⅝-, ¾-, and 1-inch diameter sizes. All sizes will stand working pressures up to 300 pounds, except the 1-inch size which will resist pressures up to 250 pounds.

Telehold Phone Attachment

American Homecraft Co., 3714 N. Milwaukee Avenue, Chicago 41, Ill., is marketing a new telephone attachment called "Telehold." This device snaps on to

the receiver and supports it on either shoulder, leaving hands free to write, dial, sew, etc. Made of black plastic with foam rubber padding under the shoulder piece, the Telehold is designed to fit all shoulders, the American Homecraft company states.

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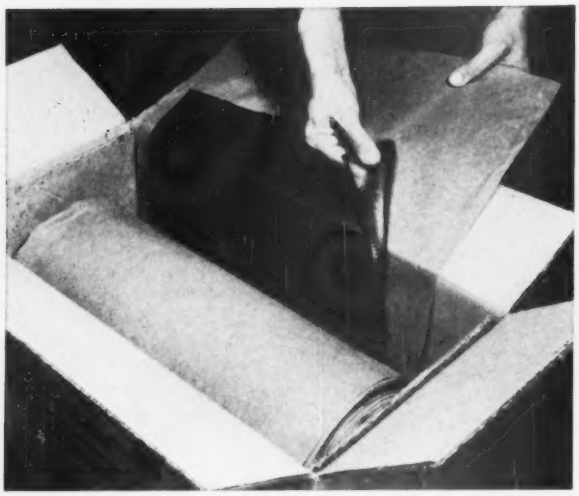

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As a protective backing or wrapping material for tacky substances, the new releasing types of Patapar Vegetable Parchment offer definite advantages over other, more expensive materials. Patapar's dense, fibre-free surface releases easily from a wide variety of uncured, natural or synthetic rubbers. Patapar is effectively used as separator sheets for rubber compounds, rubber tape, and as a backing for pressure sensitive surfaces.

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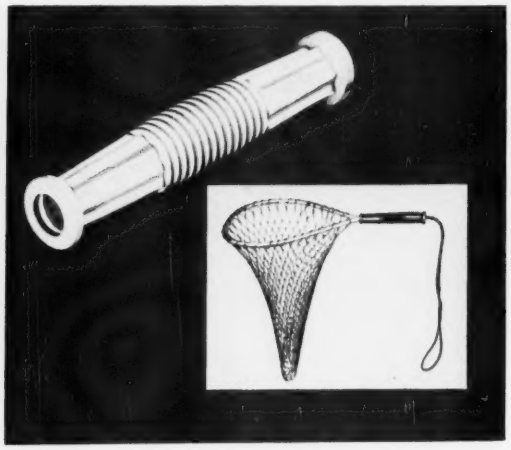
Vinyl Fish Net Grip

An all-vinyl plastic hand grip for fish nets has been developed by the Hungerford Plastic Corp., 114 Beach Street, Rockaway, N. J. Of conventional design and size, the injection molded vinyl handle is said to offer unusual gripping qualities and has a pleasant feel. The vinyl material is resistant to weather, salt water, oils and gasoline, and will not leave stains or discolorations. It



comes in red, green, yellow, maroon, black, blue, white and ivory. Special colors can be furnished if required. The grip is available for 5/8-inch stock and can be installed easily; once installed it is difficult to remove because of the frictional property of the vinyl. Hungerford all-vinyl grips are marketed through the Ohio Rubber Co., Willoughby, Ohio.

Koylon-Crestaire Sleeping Unit

U. S. Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y., is now making a new sleeping unit that is a mattress-foundation in one, without conventional coils or wire. Called the "Koylon-Crestaire," the new unit is made of foam rubber and can be inflated to make it as hard or soft as desired. The one-piece mattress-foundation is 6½ inches thick and can be bought with a wooden platform, but the company reports that it can be used over any solid base. Sold through department and furniture stores, the Koylon-Crestaire is available in twin- and double-bed sizes.

U. S. Royal Master Portable Cord

U. S. Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y., has developed a new electrical cord for use with power saws, drills, grinders, buffers and similar portable electrical machinery. The new cord, called "U. S. Royal Master Portable Cord," is said to be more than three times as resistant to wear as low-priced cords made by the continuous vulcanization process. It is also reported to be 88% stronger than the highest quality molded cords in use and to last twice as long. The new, lead-cured cord is available mainly as a replacement or maintenance item. While similar to conventional cords in appearance, it is said to differ in design and material.

Glitter Peek-A-Boot

Peek-A-Boot, Inc., 1604 South Flower Street, Los Angeles 15, Calif., is producing a transparent plastic rain boot with glitter added. The "Glitter Peek-A-Boot" is flecked with gold and is of one-piece seamless construction, guaranteed leak proof. It comes in two styles:

No. 800 Glitter Clear and No. 888 Glitter Smoke. Sizes are small, medium, large and extra large, with standard fit for all heels. A Glitter Peek-A-Bonnet rain hood is included at no extra cost with every pair of boots.

Sterling T-723 Adhesive

A new adhesive for bonding electrical insulating tapes has been developed from Bakelite vinyl resins by the Sterling Varnish Co., Haysville Borough, Sewickley, Penna. The new adhesive, called "Sterling T-723 Adhesive," is specially formulated for bonding glass mica, varnished cambric, and other varnish-saturated tapes used for insulating coils. Due to Bakelite vinyl resin's resistance to petroleum and coal-tar solvents, tape bonded with the new adhesive is not loosened or affected by dipping in varnish. When the varnish is baked on, the adhesive is hardened and strengthened by the heat, the manufacturer states. Supplied in collapsible tubes, containing approximately one or two ounces of adhesive, application to tape ends is neatly and quickly effected. For large-scale application, the adhesive is furnished in pint, quart, gallon and five-gallon cans in a slightly lower consistency.

Flexi-Grip Hammer Handle

True Temper Corp., 1623 Euclid Avenue, Cleveland 15, Ohio, is manufacturing a steel hammer with a new "Flexi-Grip" handle made of a rubber-fiber composition. The rubber grip is said to absorb shock and to prevent slipping. It is perforated all over and permanently bonded to the steel shaft of the "True Temper Rocket No. A16" hammer, and will not turn or come loose.

Fatty Acids— on Pallets!

A fork lift truck picks up the whole pallet—40 bags—in one load. Ordinary wood pallets can be used in addition to the disposable fibre pallets, to facilitate warehouse handling and stacking.

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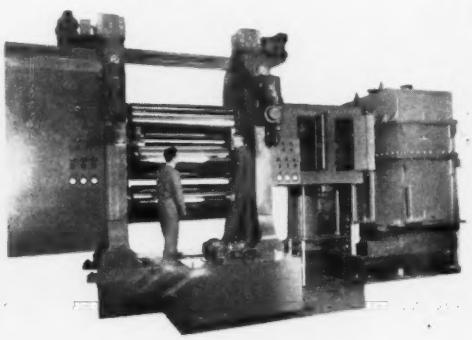
NEW EQUIPMENT

Three-Roll Sheeting and Coating Calender

A new three-roll sheeting and coating calender for the rubber industry has been developed by the Adamson United Co. of Akron, Ohio. The unit is a 24 x 68-inch three-roll, vertical machine, equipped with crossed-axis device for compensating crown during operation. As indicated in the accompanying illustration, the calender



is driven by a separate pinion stand and universal coupling, allowing the top roll to be crossed by means of a motorized device, to compensate for variable deflection. This allows the operator to change the crown at will, in effect, to compensate for changes in speed, temperature, gauge, compounding, etc. The calender is equipped with chilled-iron rolls of the peripherally-drilled type. Temperature control is achieved by means of a circulating-water temperature-control system. According to Adamson United, space required is very little more than for a conventional calender, since the main drive motor can be mounted between the calender and the pinion stand.

General Electric TSA-21 Process Timer

A new process timer, featuring "one knob" control, has been developed by the Instrument Department, General Electric Co., Schenectady 5, N. Y. Designated the TSA-21, the new product will control the timed simultaneous closing of one electric circuit and opening of another. Industrial applications for the new process timer include molding presses, machining tools, and automatic mixing operations; in addition, power distribution equipment frequently requires precision control for starting automatic sub-station equipment, and for the reclosing of automatic circuit breakers.

Ideal for equipment which requires easily adjustable and accurately timed operations from an initial impulse, the TSA-21 includes one set of time-opening main contacts and one set of electrically separate time-closing main contacts. The trip point of the main contacts can be adjusted by an external knob. Also, each timer has a set of instantaneous contacts which can be used independently or as hold contacts for the timer solenoid.

Combination Colorimeter-Spectrophotometer

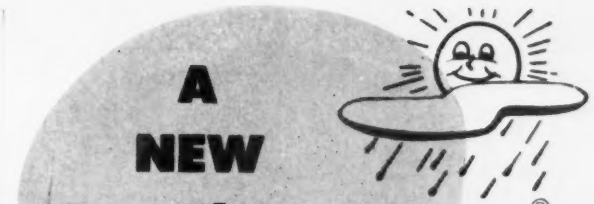
A combination colorimeter and spectrophotometer with wide applications in the rubber and other industries was recently introduced by the Bausch & Lomb Optical Co., Rochester, N.Y. Called the Spectronic 20 because of its 20mμ band pass, the instrument produces high wavelength accuracy and spectral purity through use of a diffraction grating, according to the company.

It is designed for speedy, simple operation by production-line inspectors and laboratory technicians who need use only two control knobs in making routine colorimetric analyses.

The Spectronic 20 analyzes any liquids or solids which transmit light by subjecting a sample to light of specified wavelengths. The degree of light transmittances is registered on a double scale, where readings may be taken in terms of either transmittance or optical density. The operator can adjust the diffraction grating for any wavelength in the entire range of the instrument by turning a control knob, without being limited to available filters. Effective range is from 375mμ (near ultra-violet) to 950mμ (near infra-red), according to Bausch & Lomb.

As a colorimeter, the instrument makes possible quick routine tests by subjecting the sample to fixed wavelength settings. Resulting readings can be readily interpreted as concentration values from pre-determined calibrations supplied with the instrument. More intensive study is possible by using the instrument as a spectrophotometer. Here the sample is subjected to light of the desired wavelengths to get transmittance and density readings for interpretative analysis and the construction of transmission and/or absorption curves.

Basic components are a built-in grating monochromator, a photo-emissive detector to pick up the light which passes through the sample and transmit it in the form of photo-electric current, and a printed-circuit electronic amplifying system to build up the current so it will register on the scale. For the range from 650mμ to 950mμ, an infra-red tube and filter are quickly substituted for the standard tube.



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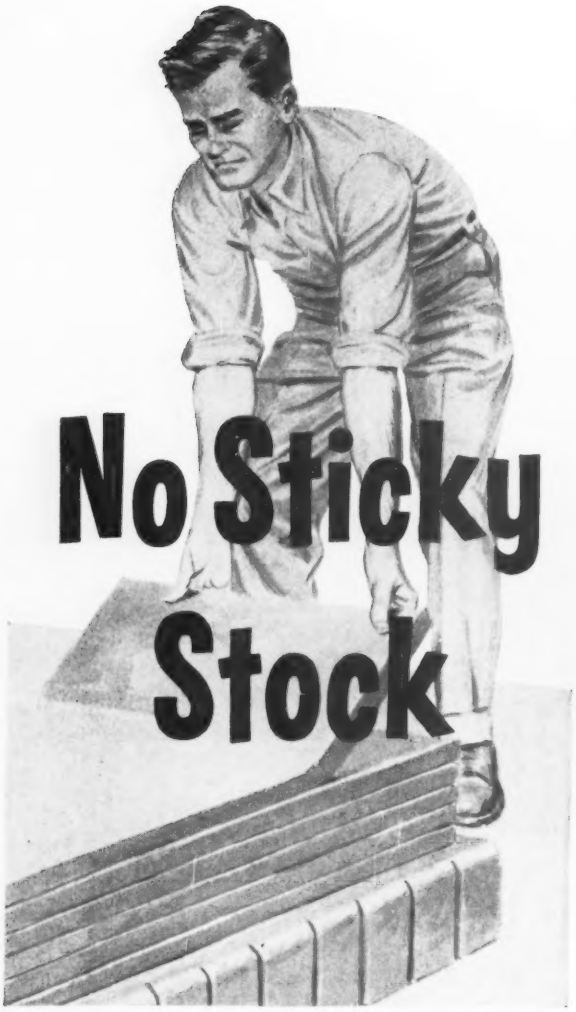

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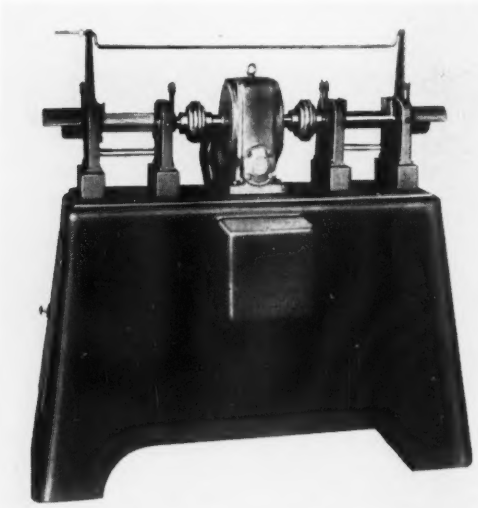
Mill-Cracker for Laboratory Use

A laboratory size dual cracker and mill has been made available to industry by Stewart Bolling & Co., Inc., 3194 East 65th St., Cleveland 27, Ohio. It was first shown at the recent National Plastics Exposition in Cleveland. The cracker, on one side of a gear reducer,



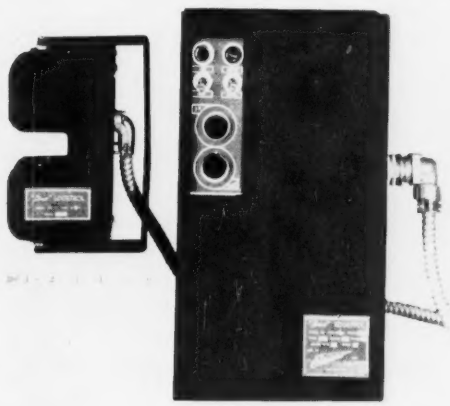
consists of one smooth and one corrugated roll for quick reduction of lump stocks. On the other side of the reducer is a two-roll midget mill for compounding plastic or rubber stocks. The rolls are 2½ inches in diameter, with a 7-inch face. All rolls have ball-bearing rotary pressure joints with flexible bronze connections. Both units are driven by a single 2 h.p. motor, and mounting is on a code height cabinet type base. Knee switches operate a safety brake. The entire unit measures approximately 5 feet wide by 4 feet high by 2½ feet in depth.

Automatic Net Weighing Machine

A new automatic net weighing machine with load discharge timer and counter for all types of free-flowing materials has been announced by the Exact Weight Scale Company of Columbus, Ohio. The net weigher is fed the free-flowing commodity by a vibratory feeder until the predetermined amount is in the weigh bucket. The bucket will not discharge its contents, however, until a pre-set time interval has elapsed. A counter unit records the number of weighments, and shuts off the operation when a pre-set number of loads have been made. A pushbutton control panel also permits manual control when desired. The unit provides visual indication of every weighment, and extremely high accuracy which remains unaffected by any normal machinery vibration. Scale is precision-built, with one-to-one ratio dynamically balanced lever. Control rheostats provide infinite adjustment of both fast and slow rate of feed to the weigh bucket, allowing greatest possible accuracy. Unit capacities are available from a few ounces up to twenty-five pounds, with dial and beam calibrations in either metric or avoirdupois.

Airlectron Photo-Electric Edge Guider

A new, improved photo-electric edge guider, which is finding application in the rubber, plastics, textile and paper industries because it has a wide sensing-head slot and recessed control panel, has been introduced by Airlectron, Inc., Caldwell, N.J. Called the Linar Edgetrol, the company claims it removes the necessity for visual or manual supervision in many types of handling and



processing operations, eliminates wastage of materials due to inaccuracy of older methods of control, speeds up operations, and reduces down time of key plant equipment.

Photo-electric guidance as developed by Edgetrol has the advantage that no force of any kind is applied on the material, in contrast to air or mechanical guiders. This new feature is said to permit accurate edge registration of very light or thin as well as heavy materials, even when not under tension. Another feature claimed for this photo-electric guider is its rapid response, resulting in an overall accuracy of 1/32-inch or better at high linear speeds at up to 60 actuations per minute.

The compact cast aluminum swivelling head is designed for easy mounting and adjustment to meet requirements of any kind of machine and process. A self-contained reversing contactor permits the Edgetrol to be used with standard tenter or other drives, either electric or hydraulic, up to 1 h.p.

With the announcement of the new **400 Series Capacitrol,** the Wheelco Instruments Division of the Barber-Colman Co., Rockford, Ill., has made available an electronic recorder of dependable modern design and operation. Completely self-contained, this new direct deflection, indicating controller is adaptable to a multitude of process applications.

Batch weighing of additives, continuous weighing of process material and the remote selection of weight ratios using a single dial control are features of a new **remote weight-control system** announced by the Richardson Scale Co., Clifton, N. J., for continuously and accurately blending additives with process material.

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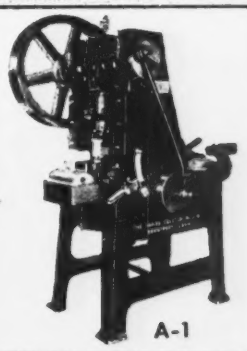

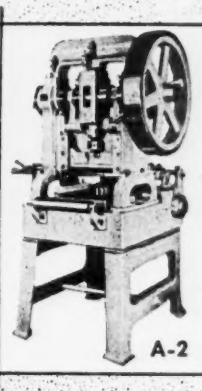

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Cutting across grain of stock.

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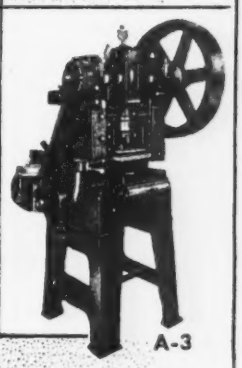

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REVIEWS

BOOKS

What Every Engineer Should Know About Rubber. By W. J. S. Naunton. Published by the British Rubber Development Board, Market Buildings, Mark Lane, London E.C. 3, England. Available from Natural Rubber Bureau, 1631 K Street, N.W., Washington 6, D. C. 5½ x 8½ in. 128 pp. 50c.

Although the unique properties of rubber make it a valuable material for numerous applications in engineering, unfortunately the engineer is not too well versed in its characteristics. The purpose of this book is to provide the necessary information to enable the engineer to make effective use of rubber. Despite the fact that it numbers only 128 pages, including a two-page subject index, the book presents a broad cross section of information on rubber written entirely with the engineer's working day in mind. The author, formerly in charge of the rubber laboratories of Imperial Chemical Industries, Ltd., and an internationally-recognized rubber technologist, has had many contacts with engineers through the years, with the result that he is able to approach the subject from the point of view of the engineer who wants to incorporate rubber in his designs. Over half the book is devoted to specific engineering uses of rubber, while the sources, properties, manufacture and testing of rubber are covered in the remainder. The chapter on manufacture has been included to enable the engineer to acquire the necessary background knowledge of the material. Although intended solely for the engineer and containing a good deal of basic information, this little volume will prove a valuable addition to the technical literature.

•

Plastics Engineering Handbook. (Second Edition). Compiled by the Society of the Plastics Industry, Inc. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. 6 x 9 in. 814 pp. $15.00.

The first edition of the "Plastics Engineering Handbook" was published in 1947. It was widely accepted by industry and a number of educational institutions adopted it as an auxiliary text book in connection with their courses on plastics. This second edition, representing the work of more than 200 engineers, technicians and other authorities in the various branches of the plastics industry, ties in with the two programs for Plastics Education which were prepared and distributed to educational institutions throughout the United States by the SPI Committee on Plastics Education. The new edition contains over 500 illustrations, diagrams, charts, tables and three special fold-out inserts. The information in it covers design, materials, processes, equipment, finishing, assembly, testing and standards of plastics and plastics products. Suppliers of plastics raw materials will find a complete set of accepted standards and specifications, while engineers and designers will find new methods outlined for testing articles made from plastics and detailed standards for inserts and tolerances of molded plastics articles.

•

Statistical Analysis in Chemistry and the Chemical Industry. By C. A. Bennett and N. L. Franklin. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 6 x 9 in. 724 pp. $8.00.

Sponsored by the Committee on Applied Mathematical Statistics of the National Research Council, this book delves deeply into statistical analysis as applied in chemistry and the chemical industry. It starts from the beginning of the subject and, dealing with each topic as completely as possible, gives the theoretical background and derivation of the analytical methods together with computational procedures. The book is divided into 11 chapters, the first five of which develop the basic principles of statistical inference in logical sequence, while the remaining chapters contain the more specialized methods which have been of greatest importance in industrial applications.

BOOKLETS, CATALOGS, etc.

Columbian Carbons in Natural and Synthetic Rubbers. Binney & Smith Co., 380 Madison Ave., New York 17, N. Y. 9½ x 12 in.

Furnished in a handsome, three-color multi-ring binder, this comprehensive technical booklet on Columbian Carbons has been compiled and designed for use by rubber compounders and technologists with specific interest in the carbon blacks. As indicated by its title, the booklet is devoted to the use of Columbian Carbons in natural and synthetic rubbers, and presents a comparative evaluation of these carbons, both as regards their basic colloidal properties and their reinforcing action.

Actually, the booklet contains a complete section devoted to carbon black loading studies in natural and synthetic rubbers, with exhaustive data presented on natural rubber, cold GR-S (1500), hot GR-S (1000), Butyl rubber (GR-I-18), and the nitrile rubbers. Complete information on the mixing, vulcanizing and testing procedures is also included. Results are shown in both tabular and graph form, with the latter appearing in attractive, multi-color charts. The data furnished should prove a valuable addition to the technical literature on carbon black.

Additional sections will be provided for the multi-ring binder as they are developed. A new addition to the first section is now in process, covering a study involving carbon black loadings in neoprene. The company is also working on another section which will involve processing studies of the several Columbian carbon blacks at different loadings in various polymers.

•

How to Pull Dollars Out of Thin Air. (Bulletin G-2). Fuller Co., Catasauqua, Penna. 8½ x 11 in. 16 pp.

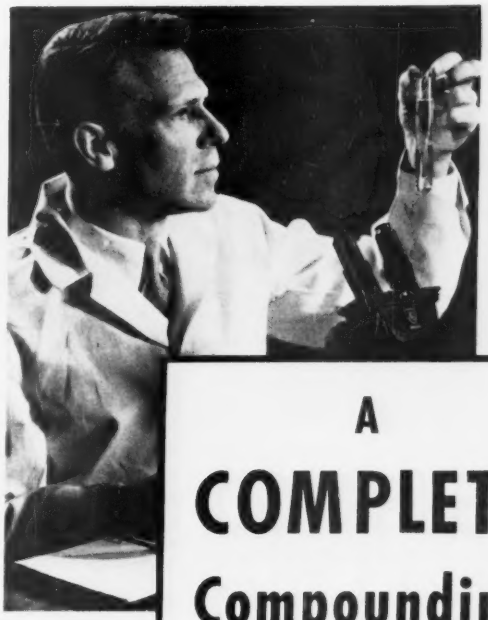
Of value to chief executives, engineers and purchasing agents in industries which handle dry pulverized materials, this bulletin concerns itself with bulk pneumatic handling. The bulletin tells how handling costs can be reduced substantially by using the proper pneumatic handling system. Also covered are the Fuller rotary compressor, the clinker cooler, and the new kiln preheater. The bulletin first lists 86 dry pulverized materials and indicates which of the three Fuller systems are best adapted to handle each material. Also given are 24 fields in which Fuller rotary compressors are used. Two pages are devoted to Fuller-Kinyon systems for conveying such materials as portland cement, pulverized coal, limestone dust, fly ash, pulverized phosphate rock, etc. Next, advantages of the "Airveyor" and "Airslide" systems are given, including information on when to use each. Two pages are devoted to Fuller rotary compressors. Included are five photographs and keyed text outlining typical applications of these machines. Other topics covered are suspension preheating of dry pulverized materials and the company's clinker coolers.

•

Morpholine. (Bulletin F-8488). Union Carbide and Carbon Corp., 30 East 42nd St., New York 17, N. Y. 8½ x 11 in. 8 pp.

Information on properties, specifications, shipping data, and safe handling practices for morpholine is given in this technical bulletin together with suggested applications and a selection of literature references. Morpholine is a reactive material with many important commercial applications. It is used for making rubber accelerators, carbon remover compounds, dyestuffs, pharmaceuticals, and quaternary compounds. Morpholine soaps are emulsifying agents in products such as self-polishing waxes, leather and furniture polishes, and paper coatings. Oils, made soluble with morpholine, are used for lubricating and cutting tool operations, for making soluble greases, for lubricating textile fibers during processing, and for insecticidal and herbicidal concentrates. Morpholine is also an excellent corrosion inhibitor for steam boilers and steam-heating systems.

Coming in the October issue of RUBBER AGE — the first in a series of articles on the European rubber industry!



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- Compounding Ingredients
- Fibers and Fabrics
- Chemistry and Physics of Vulcanized Rubber
- Tires
- Belting
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Multi-V Belt Engineering Handbook. Industrial Products Division, B. F. Goodrich Co., Akron, Ohio. 8½ x 11 in. 76 pp.

Featuring a convenient guide to the design of standard and high capacity drives, this handbook offers a compilation of data on multi-V belts. New horsepower rating tables closely approximate actual operating conditions and reflect the increased ability of modern belts. The horsepower tables permit the design or re-design of V belt drives at lower cost by reducing the number of belts needed to carry a given load and indicating the potential use of lower cost sheaves. The tables cover speed ratings from 100 to 6,000 feet per minute.

Other subjects covered in the new handbook include: selection of correct multi-V drives, installation and care of V belt drives, principles of V belt design, selection of pre-engineered V-V drives, designing a standard V-V drive not in pre-engineered tables, designing V-flat drives, multi-V quarter turn drives and double-V belt drives. A multi-V belt drive calculation sheet is also included. A series of *22* simplified, easy-to-read tables cover such aspects of V belt engineering as installation and takeup allowance, belt speeds, length correction factor, calculation of center distance and a geometry chart for drives. Thirty-one pages of tables are devoted to pre-engineered drives calculated with stock sheaves and stock sizes of V belts.

•

Pressure Recorders. (Bulletin 6-10). Foxboro Co., Foxboro, Mass. 8½ x 11 in. *24* pp.

A completely new line of pressure measuring elements with greater operating power and improved accuracy are graphically described in this bulletin. The publication fully explains the company's line of pressure instruments designed for direct measurement, remote transmission and automatic control, and widely used in instrumenting the more specialized processes of industry. An application chart "How to Select the Measuring Element" shows the wide choice of element materials available, such as corrosion-resistant Type 316 stainless steel; beryllium copper with its fine spring characteristics; and Ni-Span, notably unaffected by ambient temperatures. The exclusive Foxboro high pressure helical for pressures to 80,000 psi, as well as the diaphragm, bellows, spiral and standard helical covering ranges from 10 inches of water to 6000 psi, are diagrammed and explained. Exact ranges are listed for each material and each type of element. The bulletin also describes case and linkage features, lists charts for standard process ranges, and covers accessories such as seals and pulsation dampeners.

•

Tools of Automation. Reliance Electric and Engineering Co., 1076 Ivanhoe Road, Cleveland 10, Ohio. 8½ x 11 in. 12 pp.

This booklet expresses the company's philosophy of combining applied engineering, creative thinking, and electric motor drives to provide the "know-how" for automation of single machines or continuous processes. Many illustrations and sketches accompany each section to help tell the automation story. Individual booklet divisions illustrate the combination of motors and creative engineering as an aid to choosing the right motor for the job. Adjustable speed "V-S" drives as a tool of automation, and electronic controls and regulators that provide precise, accurate motor drive control and regulation are described. A final section of the booklet includes captioned photographs which graphically illustrate automation at work in many industries.

•

Styrene Monomer. Chemical Division, Koppers Co., Inc., Pittsburgh 19, Penna. 8½ x 11 in. *24* pp.

This handsome publication states that before 1930, styrene monomer was a laboratory curiosity. Today, millions of pounds of styrene are being produced daily for countless commercial uses, with new applications appearing constantly. This booklet describes the production of styrene monomer and the manner in which it is derived from coal to its eventual use in synthetic rubber, polystyrene, high styrene latices, polyester resins, styrene-acrylonitrile copolymers, etc. A companion publication, Technical Bulletin C-4-119, offers technical data on the material.

Plastolein Plasticizers. Emery Industries, Inc., Carew Tower, Cincinnati 2, Ohio. 8½ x 11 in. 32 pp.

In addition to containing complete descriptions and specifications of the company's line of monomeric and polymeric plasticizers, this completely revised booklet also presents performance data. It also includes an appraisal of such factors as low-temperature flexibility, volatility, water extraction, oil extraction, heat stability and light stability. The data have been arranged to simplify the selection of the proper plasticizer for a given application. While stressing those properties which determine how well a Plastolein plasticizer supplies the essential characteristics, considerable emphasis is placed upon the unique properties not found in other types of materials.

•

Paraplex and Monoplex Plasticizers. Rohm & Haas Co., Washington Square, Philadelphia 5, Penna. 8½ x 11 in.

The physical properties of "Paraplex" and "Monoplex" plasticizers are described in this technical bulletin which also includes data on performance properties of these materials. In this direction, such matters as volatility, extraction by oil, gasoline and soapy water, torsional modulus, brittle temperatures, and modulus at 100% elongation of the Paraplex and Monoplex plasticizers in comparison with other types, are outlined. The comparative properties of the different grades of Paraplex, Monoplex and dioctyl phthalate and tricresyl phosphate are shown in a handy chart.

•

Hydrofol Fatty Chemicals. Chemical Products Division, Archer-Daniels-Midland Co., 2191 West 110th St., Cleveland 2, Ohio. 8½ x 11 in. 40 pp.

Contained in this catalog are all the standard ADM fatty chemicals; hydrogenated glycerides, hydrogenated fatty acids, saturated and unsaturated fatty alcohols, sperm oils, and miscellaneous sperm oil products. For the benefit of the many manufacturers who are infrequently exposed to the terminology of the fat chemical field, the catalog includes certain basic definitions, as well as a brief description on each major classification of material.

•

Hand Lift Pallet Trucks. (P-673B). Yale Materials Handling Division, Yale & Towne Manufacturing Co., 11000 Roosevelt Blvd., Philadelphia 15, Penna. 8½ x 11 in. 12 pp.

Moving and storing of many types of multi-unit loads by Yale Pallet Hand Lift Trucks is pictured and described in this brochure. Profusely illustrated with actual application photographs showing how hand trucks can increase efficiency in handling a variety of materials, the brochure features a section describing different pallet types and designs and gives their specifications. Pictures and specifications of a wide variety of Yale Hand Lift Trucks are also included as well as cutaway photographs showing operation of both the hydraulic and mechanical lifting mechanisms.

•

Vultac 2 and 3 Alkyl Phenol Sulfides. (Report 54-5). Sharples Chemicals Inc., 1100 Widener Bldg., Philadelphia 7, Penna. 8½ x 11 in. 12 pp.

Prepared in handy loose-leaf style, this report deals with the use of Vultac 2 and 3 as a partial or total replacement for sulfur. The grades and properties of the material are outlined and other information as to toxicity and method of pack is also given. This is followed by tabular matter illustrating the use of Vultac 2 in several base compounds such as GR-S 1000, a GR-S 100-natural rubber blend, in a natural rubber tread-type compound and in a low styrene polymer (GR-S X-632).

•

Meters and Controls for the Process Industries. (Bulletin 17-F). Bailey Meter Co., 1050 Ivanhoe Road, Cleveland 10, Ohio. 8½ x 11 in. 16 pp.

Instrumentation for the modern process plant is presented in this new bulletin. Detailed equipment descriptions and illustrations include basic specifications for measuring, transmitting, receiving, interpreting, and controlling eighteen variables normally encountered in the production processes.

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RUBBER RC CORPORATION OF AMERICA

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- GR-S Latex Concentrate
- Natural and Synthetic Latex Compounds
- Plastisols

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DIOP	(Di-Iso-Octyl Phthalate)
ODP	(Iso-Octyl Iso-Decyl Phthalate)
O-16	(Iso-Octyl Palmitate)
TG-8	(Triethylene Glycol Dicaprylate)
TG-9	(Triethylene Glycol Dipelargonate)
DOP	(Di-2 Ethylhexyl Phthalate)
DOA	(Di-2 Ethylhexyl Adipate)
DIOA	(Di-Iso-Octyl Adipate)
DOS	(Di-2 Ethylhexyl Sebacate)
DIOS	(Di-Iso-Octyl Sebacate)
DBP	(Dibutyl Phthalate)

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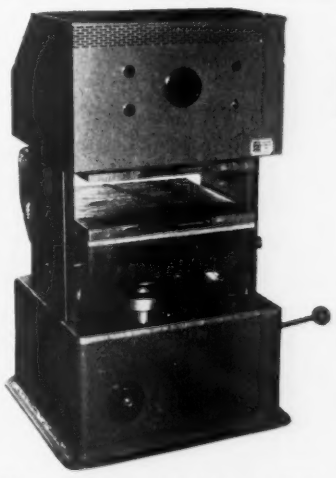

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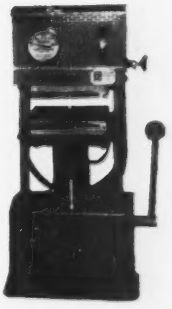

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MARKETS

NEWS-PRICES

NEW YORK, SEPT. 8, 1954

Natural Rubber

Since our last report (August 2), the average price of spot rubber on the New York Commodity Exchange has moved in a range of 87 points, high for the period being 23.75c reached on August 2, and low being 22.88c reached on August 16. The average price of spot cotton for the month of August was 23.26c based on 22 trading days. This compares with an average of 24.12c in July.

Writing in the September, 1954, issue of the *Natural Rubber News*, H. C. Bugbee, president of the Natural Rubber Bureau, notes that it is now nearly four months since the Colombo Rubber Study Group concluded that out of an expected world production of 1,705,000 long tons of natural rubber there might remain available for absorption into governmental and commercial stocks some 24,000 long tons. This expected surplus of little more than 1% of expected production was so slight that the smallest miscalculation could turn it into a deficit.

Mr. Bugbee states that the resistance of the natural rubber market to the industry strikes in July and August and the unconcerned reaction of the market to the low U. S. consumption figure for July, indicates that there is, in fact, no surplus of natural rubber.

The conclusion one draws from the statistics at the mid-point of 1954, states Mr. Bugbee, is that world natural rubber production will be less than the 1,705,000 long tons forecast by the Rubber Study Group and that consumption will exceed the 1,681,000 long tons forecast by the Group.

Mr. Bugbee believes that the most important index to watch in the months ahead will be the ratio of natural to synthetic rubber consumption in the United States. It is obvious, he states, that the tight natural rubber position at this time does present the Southeast Asia Conference in Manila with an excellent opportunity of permanently assisting the economies of the rubber producing countries of Southeast Asia with a readjustment of the synthetic rubber price from now until the plants are in private hands.

More Rubber for Rice?

A Ceylon delegation has left for Red China to negotiate a new rubber-rice trade agreement between the two countries. Under the agreement reached in 1952, Ceylon agreed to supply Red China with 50,000 metric tons of sheet rubber annually for a period of five years, commencing January 1, 1953. In return, Red China agreed to supply Ceylon with 270,000 metric tons of rice annually over the same period.

The price for these products was to be fixed every year. China agreed to pay a price for rubber in excess of the Singapore f.o.b. market price. In the event of Singapore prices exceeding the price fixed between the two countries, new prices would be negotiated. At present, rice production in Ceylon has improved. It is understood that in the forthcoming negotiations, Ceylon will seek to buy less rice from China, depending on the extent of China's purchases of rubber from Ceylon.

Price Data

Closing Rubber Prices on New York Commodity Exchange (No. 1 R.S.S. Contract)

FROM AUGUST 2 TO SEPTEMBER 8

Aug.	Spot	Sept.	Dec.	Mar.	May	Sales
2	23.75	23.85	24.10	24.15	24.25	32
3	23.62	23.79	24.10	24.20	24.25	47
4	23.38	23.64	23.95	24.02	24.15	46
5	23.38	23.60	23.80	23.87	23.95	97
6	23.38	23.65	23.94	24.00	24.10	27
7	....	....	....	....	....	....
8	....	....	....	....	....	....
9	23.38	23.40	23.80	23.95	24.00	20
10	23.12	23.31	23.65	23.75	23.80	196
11	23.12	23.50	23.85	23.99	24.00	18
12	23.25	23.45	23.83	23.95	24.00	26
13	23.00	23.00	23.37	23.47	23.52	97
14	....	....	....	....	....	....
15	....	....	....	....	....	....
16	22.88	22.90	23.31	23.42	23.47	51
17	23.00	23.20	23.45	23.55	23.60	29
18	23.38	23.50	23.85	23.95	24.08	102
19	23.25	23.36	23.75	23.80	23.85	24
20	23.12	23.34	23.70	23.80	23.85	9
21	....	....	....	....	....	....
22	....	....	....	....	....	....
23	23.00	23.10	23.60	23.60	23.65	87
24	23.12	23.00	23.45	23.55	23.60	20
25	23.25	23.40	23.75	23.80	23.85	141
26	23.25	23.45	23.84	23.85	23.90	61
27	23.50	23.75	24.05	24.20	24.20	134
28	....	....	....	....	....	....
29	....	....	....	....	....	....
30	23.25	23.35	23.70	23.75	23.80	37
31	23.25	23.15	23.70	23.80	23.87	116
Sept.						
1	23.38	23.35	23.80	23.90	24.00	14
2	23.38	23.20	23.75	24.00	24.12	12
3	23.25	23.05	23.65	23.85	23.95	24
4	....	....	....	....	....	....
5	....	....	....	....	....	....
6	....	....	....	....	....	....
7	23.50	23.40	23.95	24.10	24.20	59
8	23.75	23.97	24.35	24.55	24.60	192

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.23¾
September	.23¾
October	.23⅞
Thin Latex Crepe:	
Spot	.28
Thin Brown Crepe, No. 2	.23⅞
Smoked Blankets	
Flat Bark Crepe	.19¼

London Market

(Standard Smoked Sheets)

Oct.-Dec.	23.81 - 24.11
Jan.-Mar.	23.81 - 23.96

Singapore Market

(Standard Smoked Sheets)

October	22.53 - 22.61

Synthetic Rubber

(Dry Types—Per Pound)

Butaprene NF	.490 - .500
Butaprene NL	.500 - .510
Butaprene NAA	.540 - .550
Butaprene NXM	.580 - .590
Chemigum 30N4NS	.500 - .510
Chemigum 50N4NS	.500 - .510
Chemigum N3	.580 - .590
G-E Silicone Rubber (compounded)	2.50 -3.60
G-E Silicone Gum (not compounded)	4.00 -4.20
GR-I	—— - .230
GR-S	—— - .230
Hycar OR-15	.580 - .590
Hycar OR-25	.500 - .510
Hycar OS-10	.550 - .560
Neoprene Types AC and CG	—— - .550
Neoprene Type GN	—— - .410
Neoprene Type GN-A	—— - .410
Neoprene Type GRT	—— - .420
Neoprene Type KNR	—— - .750
Neoprene Type O	—— -1.00
Neoprene Type S	—— - .420
Neoprene Type W	—— - .410
Neoprene Type WRT	—— - .450
Paracril B	.500 - .510
Paracril BJ	.500 - .510
Paracril C	.580 - .590
Silastic (compounded)	1.95 - .338
Thiokol Type A	—— - .470
Thiokol Type FA	—— - .640
Thiokol PR-1	—— - .950
Thiokol Type ST	—— -1.000

Middling Upland Quotations

	Aug. 2	September 8		
	Close	High	Low	Close
Oct.	34.38	34.70	34.32	34.54
Dec.	34.55	35.05	34.66	34.90
Mar.	34.70	35.47	35.05	35.30

Synthetic Rubber

Government and trade authorities are still trying to gauge the effect of recent strikes in the rubber industry on the overall synthetic rubber program. In mid-August, spokesmen for the Federal Facilities Corporation stated that as of that time the strikes had had no effect upon the synthetic rubber program. It was stated that the rubber program was used to weathering "short-term strikes" and that the current strike wave had not hurt much.

Earlier, on August 2, FFC had announced its sales and production estimates for the coming months. FFC stated that in September, October and November, 40,500 long tons of GR-S would be produced each month. These figures were somewhat below previous estimates. Sales estimates were also off, the figure given for November being 7% below the October estimate.

It must be remembered that FFC sales estimates are based on orders by large customers who are required to make firm commitments ninety days in advance of delivery. In other words, the full effect of the strikes upon the government rubber program may not be fully ascertained until sales and production figures are estimated for December and the immediate months which follow.

Only two of the government-owned plants were affected because of the strike, both of them relatively small plants in Akron. One is operated for the government by Goodyear while the other is operated by Firestone. These firms also manage two larger synthetic plants for the government, one at Houston, Texas (Goodyear), and the other at Lake Charles, La. (Firestone). Employees of these two plants, however, are members of a different union, the C.I.O. Oil Workers.

Statistical Position

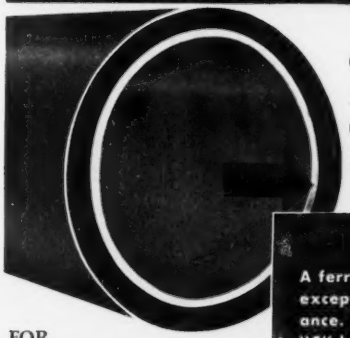
Generally speaking, since the cessation of hostilities in Korea, consumption of new rubber has shown a rather steady decline. In the transportation segment of the industry, for example, 400,573 long tons of new rubber were consumed in the first six months of this year, as compared with the 473,545 consumed in the first six months of the previous year.

In the non-transportation segment of the industry, 222,865 long tons of new rubber were consumed in the first six months of 1954, while 255,454 long tons were consumed in the first six months of the previous year.

By extending the figures for 1954, it will be seen that about 100,000 long tons less of new rubber will be consumed than in the preceding year. Most of this loss will come from synthetic rubber. In the first six months of 1954, for example, 198,636 long tons of synthetic rubber were consumed by the transportation segment of the industry, while in the first six months of 1953, 285,907 long tons of synthetic were consumed by the transportation segment. This difference alone will almost account for the disparity in total new rubber consumption.

U. S. Commerce Department figures show that in the first seven months of this year, 268,302 long tons of synthetic were produced, compared with the 442,479 long tons produced in the first seven months of the previous year. No great disparity is seen in figures for stocks on hand, however. As of July 31, 1954, there were 128,794 long tons on hand, and as of July 31, 1953, there were 127,278 long tons on hand.

MEETING the PROBLEMS of the RUBBER- PLASTICS INDUSTRIES



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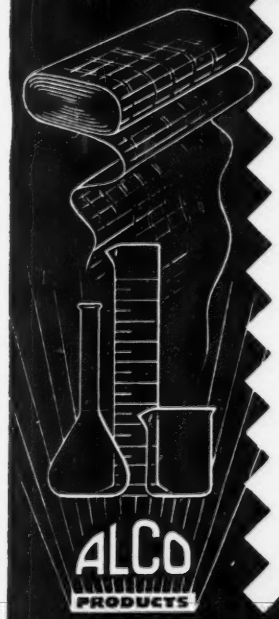

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MARKETS

NEWS-PRICES

NEW YORK, SEPT. 8, 1954

Reclaimed Rubber

According to the U. S. Department of Commerce, production of reclaimed rubber in the first seven months of this year totaled 147,147 long tons, compared with the 183,725 long tons produced in the first seven months of the previous year. Consumption in the first seven months of this year amounted to 142,411 long tons, against the 176,535 long tons consumed in the first seven months of 1953.

Department figures indicate that almost identical quantities of reclaim were exported in the first seven months of 1953 and 1954; 6,925 long tons in the prior year, 6,942 long tons this year. As of July 31, 1954, there were 31,910 long tons of reclaimed rubber in stocks, while on July 31, 1953, there were 31,506 long tons on hand.

The market for reclaimed rubber is reported by the trade as fair. There have not been any substantial price changes during the period.

(Prices for All Areas Except Calif.)

	per lb.
Premium Grade Whole Tire	.10½
First Line Whole Tire	.10
Second Line Whole Tire	.09½
Third Line Whole Tire	.09¼
Fourth Line Whole Tire	.08¾
Black Carcass	.14¼
No. 1 Light Colored Carcass	.20¾
No. 1 Select Peel	.11¾
No. 1 Peel	.10½
Butyl Tube Reclaim	.12½
Natural Rubber Black Tube	.15
Natural Rubber Red Tube	.21
Natural Rubber Gray Tube	.21

Scrap Rubber

Slow trading conditions prevail in the scrap rubber market. Although virtually all reclaimers have resumed operations following their vacation shutdowns, they showed little inclination to purchase scrap rubber. Buying of scrap was apparently limited to immediate needs and there is no evidence of purchases being made for stockpiling purposes. Most market factors considered current quotations as strictly nominal in view of the lack of volume sales.

Scrap rubber exports from the U. S. declined to 1,797,580 pounds valued at $47,122 in May from the 2,062,364 pounds valued at $104,495 in April, according to the Department of Commerce. Scrap rubber exports in May of last year totaled 2,787,927 pounds valued at $67,727.

(Prices Delivered Akron)

Mixed tires	ton	13.50
Light colored carcass	lb.	.05½
No. 1 peelings	ton	45.00
No. 2 peelings	ton	30.00
No. 3 peelings	ton	24.00
Buffings	ton	19.00
Truck and Bus S.A.G.	ton	17.00
Passenger S.A.G.	ton	15.00
Natural Rubber Red Tubes	lb.	.08
Natural Rubber Black Tubes	lb.	.05½
Butyl Rubber Tubes	lb.	.02¾

Tire Fabrics

According to reports from the trade, intensive technological research is being carried on in the rayon tire cord field as individual rayon producers have stepped up their efforts in a competitive race to increase the strength of their product. Recent impressive gains by nylon in this field, despite its higher price, have further stimulated such research.

Leading rayon producers actually have been striving to improve high tenacity rayon for tire cord and other uses for a number of years. A little more than a year ago, DuPont came out with an improved, stronger high tenacity rayon, called "Super Cordura." Since then, other rayon producers have intensified efforts to develop a similarly strong material.

One result has been a 10% increase in the strength of regular high tenacity rayon which is used for most tire cord. DuPont's Cordura, however, still is said to remain consideraby stronger and sells at a premium. But steady progress has been made by other rayon producers in attaining a similarly superior high tenacity rayon. Recently, North American Rayon announced that it would sell a super-strong high tenacity rayon at a premium price. Other leading rayon producers, such as American Viscose, American Enka and Industrial Rayon, expect to have their own extra-strong high tenacity rayon on the market soon.

One leading producer of rayon, for example, reports that the tests it has made on its new high tenacity rayon have been highly encouraging and that similar tests by tire companies have confirmed these findings. The next step is to get this new high tenacity rayon, which thus far has been produced only experimentally, into full-scale commercial production.

Nylon Makes Rapid Gains

Efforts by rayon producers to improve their tire cord product have been spurred by the rapid gains made by nylon. It is reported that just three brands of tires used nylon a year ago. Today, there are said to be 27 brands by 12 manufacturers on the market.

According to the Bureau of the Census, nylon tire cord output for 1952 was 8,082,000 pounds and rose to 18,850,000 pounds in 1953. In the first quarter of this year, output totaled 5,300,000 pounds and in the second quarter climbed to 8,400,000 pounds. Output of rayon tire cord in 1952 totaled 383,897,000 pounds and in 1953 totaled 428,000,000 pounds. But output declined sharply in the first half of this year compared with the same period of the preceding year.

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb.	.76½
1650	lb.	.73½
2200	lb.	.73

Nylon Tire Cord

210	lb.	2.00
840	lb.	2.00

Rayon Graded Fabric

1100	lb.	.72
1650	lb.	.69½
2200	lb.	.68½

Cotton Chafers

14.4 oz. (per square yard)	lb.	.74
9.25 oz. (per square yard)	lb.	.69½
11.65 oz. (per square yard)	lb.	.66
8.9 oz. (per square yard)	lb.	.71

Liquid Latex

Natural: The U. S. Department of Commerce reports that in the first six months of the current year, 32,818 long tons of Hevea latex were imported into the United States, against the 37,513 long tons imported in the first half of the preceding year. Consumption in the first half of this year was estimated at 40,011, only 131 long tons less than in the comparable period of 1953. Stocks on June 30 totaled 10,079 long tons, against the 9,256 on hand on June 30, 1953.

London reports that its market has been featureless and consumers have shown little interest. London estimates that because of the strikes in the U. S., consumption in this country is likely to be in the order of 5,700 tons per month rather than the 6,200 previously estimated.

Synthetic: The Commerce Department also reports that in the first seven months of this year, 26,641 long tons of GR-S latex were produced, 24,372 consumed and stocks, as of July 31, stood at 5,536 long tons. In the first seven months of the preceding year, 28,625 long tons were produced and 28,594 consumed. On July 31, 1953, there were 5,861 long tons on hand.

As for neoprene latices, in the first seven months of this year, 4,594 long tons were produced and 4,165 long tons consumed. Stocks as of July 31, 1954, stood at 990 long tons. In the first seven months of 1953, 5,352 long tons were produced and 4,846 long tons consumed. Stocks on July 31, 1953, were 1,162 long tons.

There were 3,641 long tons of X-type latices produced in the first seven months of 1953 and 2,251 long tons consumed. Stocks on July 31, 1954, stood at 807 long tons.

Cotton

The price of middling uplands on the New York Cotton Exchange has moved in the rather narrow range of 40 points since our last report (August 2), high for the period being 35.40c reached on August 5 and 6 and again on September 8, and low being 35.00c reached on August 9. The average price of middling uplands for the month of August was 35.19c based on 22 trading days. This compares with an average of 35.37c in July.

The Department of Agriculture announced on September 8 that drought and extremely hot weather in August had cut this year's cotton prospects by 7%. It estimated the crop at 11,832,000 bales of 500 pounds each, 848,000 bales less than the estimate as of August 1.

A crop of this size would be about 1,868,000 bales, or nearly 14%, below prospective domestic and export market demands for the current marketing year. The deficit would be supplied from a carryover reserve of 9,700,000 from past big crops. Most of this surplus is stored under the government price support program.

The Export-Import Bank has announced the signing of a $60,000,000 credit agreement with the Bank of Japan to cover Japanese purchases of United States cotton during the next 11 months. This was the fourth cotton credit extended to the Bank of Japan. The first three covered cotton purchases during 1952, 1953 and 1954. The first two were for $40,000,000 each and the third for $60,000,000.

Japan has been the largest foreign buyer of U. S. cotton in recent years. During the 1953-54 crop year, 950,000 bales were exported to Japan.

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STATISTICS

of interest to the rubber industry

Natural Rubber in the United States

(Including Latex and Guayule)

(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1925	400,423	388,500	14,827	51,215
1926	417,643	366,200	17,671	72,510
1927	431,246	373,000	27,775	99,282
1928	439,731	437,000	32,159	65,454
1929	565,087	467,400	36,485	118,609
1930	487,628	376,000	30,205	201,000
1931	501,788	355,200	25,609	322,000
1932	414,668	336,700	20,937	379,000
1933	418,902	412,400	20,576	365,000
1934	463,018	462,500	23,856	355,000
1935	467,146	495,500	11,391	303,000
1936	488,145	575,000	12,582	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1947	688,354	562,661	4,101	129,038
1948	735,227	627,332	6,673	141,541
1949	660,792	574,522	6,253	106,619
1950	802,249	720,268	8,644	89,215
1951	733,048	454,015	2,603	76,569
1952	805,997	453,846	3,024	95,260
1953	647,150	553,473	8,376	112,316
1953:				
Nov.	49,743	43,251	1,107	113,899
Dec.	45,947	42,400	923	112,316
1954:				
Jan.	47,140	46,960	648	112,679
Feb.	42,645	46,897	638	115,228
Mar.	47,721	53,709	460	112,829
Apr.	49,855	51,451	918	106,564
May	55,983	51,398	355	104,377
June	66,698	54,253	524	104,541
July	.....	37,650	440	109,869

Source: U. S. Department of Commerce.

U. S. Imports of Natural Rubber

Year	Dry: Long Tons	Dry: Declared Value	Latex: Long Tons	Latex: Declared Value	Total Imports
1937	574,600	237,307,041	23,185	10,213,670	597,785
1938	397,640	125,373,864	11,944	4,168,127	409,584
1939	469,946	167,586,780	27,437	10,467,552	497,383
1940	781,202	303,308,823	33,789	14,593,466	814,991
1941	989,498	401,976,317	34,797	15,965,627	1,024,245
1942	266,276	112,537,426	10,646	5,630,667	276,922
1943	50,358	31,369,198	1,890	1,312,202	52,248
1944	103,847	73,908,549	3,091	2,092,211	106,938
1945	134,408	95,814,102	4,773	3,115,853	139,181
1946	376,502	228,796,110	8,421	5,843,085	384,923
1947	691,087	306,951,814	17,542	9,787,722	708,629
1948	702,293	290,849,177	32,745	18,288,223	735,038
1949	630,808	225,343,624	29,743	14,968,650	660,551
1950	747,109	416,222,598	54,401	41,764,486	801,510
1951	677,874	727,343,348	54,963	80,178,309	732,837
1952	756,987	578,179,519	48,228	40,563,116	805,215
1953	571,635	284,909,223	75,511	46,353,333	647,146
1953:					
Sept.	52,498	23,968,865	6,127	3,405,762	58,625
Oct.	40,638	18,037,134	6,537	3,844,351	47,175
Nov.	44,917	20,555,812	4,826	2,621,299	49,743
Dec.	38,779	15,883,810	7,169	3,819,828	45,948
1954:					
Jan.	41,744	15,981,655	5,396	2,696,694	47,140
Feb.	36,964	14,148,159	5,681	2,931,860	42,645
Mar.	42,039	15,823,475	5,682	3,031,963	47,721
Apr.	44,193	16,605,910	5,663	2,855,180	49,856
May	52,177	19,493,956	3,806	1,907,249	55,983

Source: Bureau of the Census, U. S. Department of Commerce.

World Production of Natural Rubber

(Including Latex)

(Long Tons)

Year	Malaya	Indonesia	Ceylon	Viet Nam & Cambodia	Latin America	Rest of World*	Total*
1942	155,000*	200,000*	101,500	76,177	35,794	71,476	640,000
1943	75,000*	100,000*	105,500	70,370	41,900	72,507	465,000
1944	25,000*	50,000*	98,500	60,419	49,946	77,002	360,000
1945	8,600*	10,000*	97,500	12,000*	47,125	73,570	250,000
1946	403,719	175,000*	94,000	19,975	39,678*	105,080	837,500
1947	646,362	277,951	89,000	38,128	34,928*	172,792	1,260,000
1948	698,189	432,349	95,000	43,935	29,158*	226,056	1,525,000
1949	671,503	432,996	89,500	43,010	27,318*	225,907	1,490,000
1950	694,090	696,472	113,500	48,482	26,902*	279,541	1,860,000
1951	605,346	814,406	105,000	52,136	29,777*	277,716	1,885,000
1952	584,828	749,241	96,500	63,134	35,475*	260,111	1,790,000
1953	574,390	692,164	98,610	74,545	35,318*	249,644	1,725,000
1953:							
Oct.	49,383	53,841	8,364	7,641	3,026*	21,046	145,000
Nov.	48,393	50,885	13,938	8,520	3,097*	20,868	145,000
Dec.	52,600	64,398	12,718	10,561	2,932*	22,875	165,000
1954:							
Jan.	49,424	59,092	10,008	7,958	3,514*	22,717	152,500
Feb.	43,366	53,276	6,333	1,234	2,362*	20,246	127,500
Mar.	42,130	59,875	4,540	3,119	2,434*	25,559	137,500
Apr.	42,228	58,170	7,246	....	500*	13,838	135,000
May	48,711	55,719	5,296	....	500*	12,457	135,000

Source: International Rubber Study Group. * Estimated.

World Consumption of Natural and Synthetic Rubber

(Including Latex)

(Long Tons)

Year	United States	United Kingdom	Canada	Europe*	Rest of World*	Total*
1943	488,525	66,730	32,896	150,000	156,104	907,500
1944	710,783	86,977	34,310	132,500	160,690	1,125,000
1945	799,009	91,047	41,836	87,500	108,164	1,127,500
1946	1,039,296	126,770	39,196	145,000	115,804	1,467,500
1947	1,122,327	156,399	61,452	242,500	153,548	1,735,000
1948	1,069,404	196,286	62,121	392,000	182,379	1,902,500
1949	988,903	186,622	56,362	446,500	207,388	1,887,500
1950	1,258,557	222,425	68,695	448,500	287,055	2,285,000
1951	1,214,298	238,101	70,809	476,500	314,941	2,312,500
1952	1,261,413	202,179	67,099	550,000	254,901	2,335,000
1953	1,338,309	211,453	73,394	520,750	343,606	2,487,500
1953:						
Sept.	103,877	18,210	5,904	41,500	34,596	205,000
Oct.	105,259	21,838	6,095	42,750	28,905	205,000
Nov.	95,921	20,621	6,237	56,250	30,013	210,000
Dec.	96,052	17,411	6,127	40,500	30,123	190,000
1954:						
Jan.	97,133	20,862	5,643	41,000	33,107	197,500
Feb.	95,957	17,985	6,564	41,250	25,936	187,500
Mar.	109,769	19,795	6,519	43,500	29,731	210,000
Apr.	105,105	20,432	5,971	40,250	41,279	212,500
May	103,590	19,523	6,201	41,500	25,789	197,500

Source: International Rubber Study Group. * Estimated.

U. S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

(All Quantities in Long Tons)

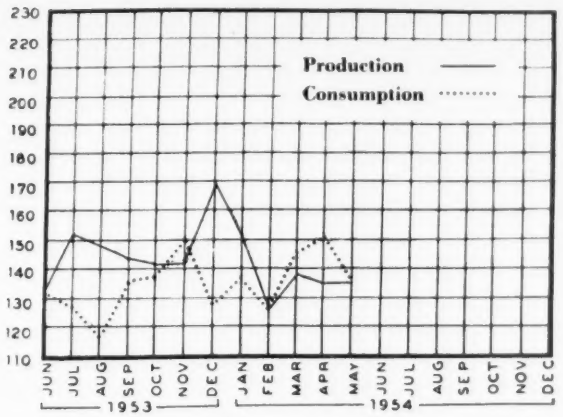
Year	Balata: Tons	Balata: Value	Jelutong: Tons	Jelutong: Value	Gutta-Percha & Other Guttas: Tons	Gutta-Percha & Other Guttas: Value
1943	1,047	708,701	35	14,840	....	.....
1944	1,012	660,805	88	45,578	10	4,999
1945	1,361	907,253	....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458,064
1947	1,982	2,276,531	2,878	1,496,887	392	779,591
1948	1,195	805,078	3,401	2,377,765	423	542,788
1949	1,391	814,554	1,043	834,978	197	189,021
1950	2,117	1,589,885	1,789	1,515,162	541	745,418
1951	2,452	1,973,271	1,669	2,608,359	383	430,539
1952	988	762,994	1,636	2,094,983	282	385,890
1953	1,619	866,248	1,027	1,166,837	235	303,116
1953:						
Aug.	124	75,627	96	103,480	7	13,743
Sept.	133	59,783	77	105,542	21	41,681
Oct.	50	23,033	101	110,166	10	18,363
Nov.	107	56,544	73	77,496	19	31,834
Dec.	342	148,582	56	55,136	60	33,175
1954:						
Jan.	61	30,769	74	60,746	9	23,425
Feb.	44	18,583	98	88,964	33	28,464
Mar.	19	22,053	59	73,541	19	17,213
Apr.	131	64,025	226	312,654	54	45,733
May	90	35,350	192	232,496	27	37,329

Source: U. S. Department of Commerce.

STATISTICS at a glance

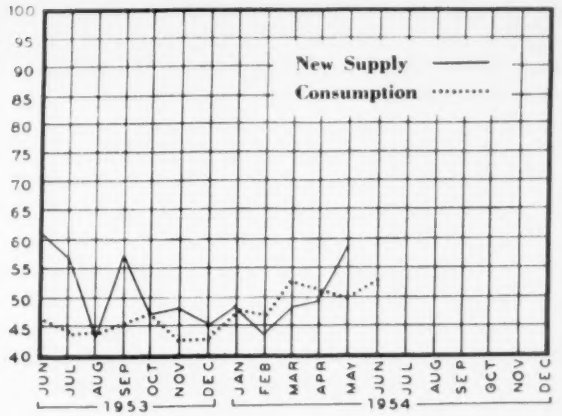
NATURAL RUBBER—WORLD

(thousands of long tons)



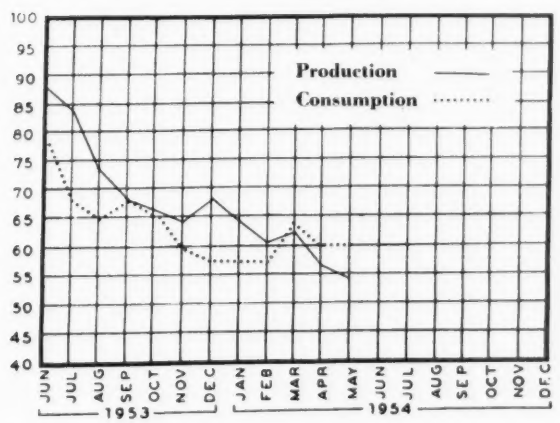
NATURAL RUBBER—UNITED STATES

(thousands of long tons)



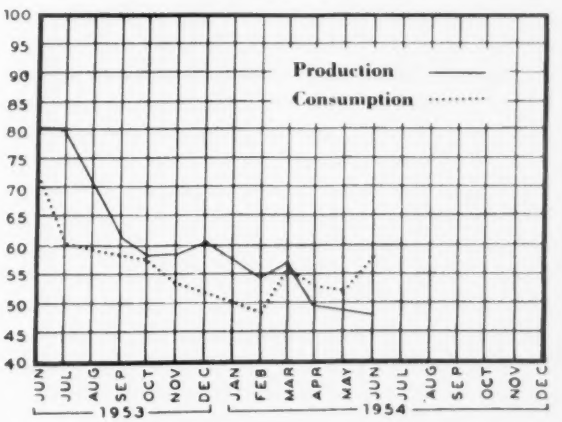
SYNTHETIC RUBBER—WORLD

(thousands of long tons)



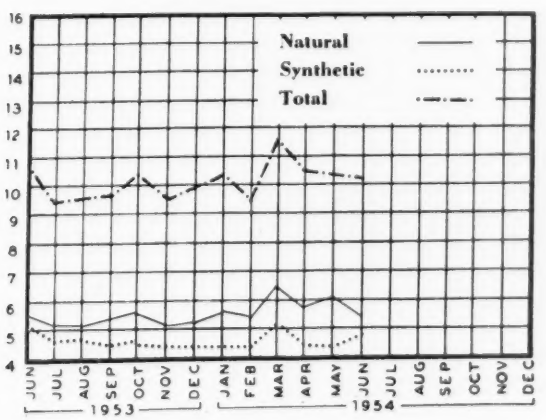
SYNTHETIC RUBBER—UNITED STATES

(thousands of long tons)



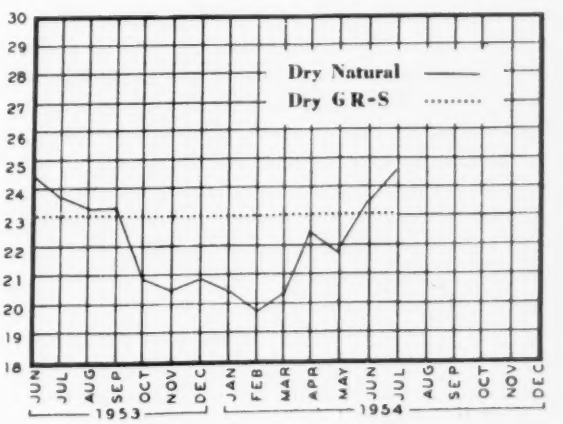
LATEX CONSUMPTION IN THE U. S.

(thousands of long tons)



PRICES—NATURAL AND SYNTHETIC

(cents per pound)



Synthetic Rubber in the United States

(All Quantities in Long Tons)

New Supply

Year	GR-S	Neoprene	Butyl	N-Type	Total
1945	724,859	45,672	52,378	7,871	830,780
1946	613,408	47,766	80,823	5,738	747,735
1947	408,858	31,495	62,824	6,618	509,795
1948	405,492	34,848	56,662	7,012	504,014
1949	310,529	35,215	54,046	11,072	410,932
1950	378,887	50,067	60,915	12,037	501,906
1951	704,529	58,907	76,475	15,333	855,244
1952	654,854	65,745	81,630	16,228	818,447
1953	680,728	80,495	79,801	20,198	861,222
1953:					
Nov.	43,020	7,137	6,036	1,777	57,970
Dec.	45,902	6,990	6,057	1,459	60,408
1954:					
Jan.	44,377	6,513	5,539	1,620	58,049
Feb.	41,691	6,206	4,801	1,574	54,272
Mar.	44,464	5,190	5,214	1,900	56,768
Apr.	35,551	5,601	6,004	1,645	48,801
May	36,237	4,828	4,581	1,960	47,606
June	37,092	5,101	3,182	1,696	47,071
July	36,579	4,673	4,960	1,814	48,026

Consumption

1945	600,145	42,394	43,012	8,029	693,580
1946	632,126	44,357	79,228	5,988	761,699
1947	448,589	37,703	68,838	4,536	559,666
1948	345,313	32,118	58,870	5,771	442,072
1949	299,420	31,753	50,855	8,827	414,381
1950	416,230	43,781	66,348	11,930	538,289
1951	626,444	48,887	70,500	13,066	758,897
1952	666,420	55,522	71,229	13,866	807,037
1953	624,181	65,900	77,826	16,929	784,836
1953:					
Nov.	41,604	4,911	4,919	1,236	52,670
Dec.	40,018	4,836	4,808	1,240	50,902
1954:					
Jan.	38,689	4,774	5,438	1,272	50,173
Feb.	37,707	4,467	5,696	1,190	49,066
Mar.	43,136	5,177	6,300	1,447	56,060
Apr.	41,324	4,694	6,241	1,395	53,654
May	41,174	4,486	5,602	1,366	52,628
June	44,974	4,769	5,961	1,491	57,195
July	32,726	3,435	4,050	1,113	41,324

Exports

1945	76,555	5,837	980	406	83,778
1946	68,763	2,642	495	797	72,697
1947	7,951	2,617	62	755	11,385
1948	1,093	2,875	21	885	4,874
1949	1,401	3,330	178	1,574	6,483
1950	900	4,826	31	1,895	7,652
1951	483	6,825	216	1,725	9,249
1952	9,467	9,813	126	2,695	22,101
1953	7,692	11,494	237	3,245	22,668
1953:					
Nov.	729	1,155	11	409	2,304
Dec.	791	1,416	6	414	2,627
1954:					
Jan.	618	434	0	295	1,347
Feb.	508	1,251	2	287	2,048
Mar.	1,265	930	416	288	2,899
Apr.	520	1,296	62	454	2,332
May	1,115	844	373	395	2,727
June	881	694	216	215	2,006
July	998	769	295	305	2,367

Stocks

1945	170,571	9,703	18,378	4,802	203,454
1946	81,483	10,470	19,478	3,755	115,186
1947	40,606	5,237	13,184	3,339	62,366
1948	96,282	5,072	10,995	2,762	115,111
1949	77,731	4,654	12,224	3,433	98,042
1950	36,942	5,733	7,243	2,840	52,758
1951	105,271	8,379	12,481	3,821	129,912
1952	83,861	8,535	22,716	3,875	118,987
1953	135,153	11,480	24,866	4,346	175,845
1953:					
Nov.	127,464	11,067	23,401	4,591	166,523
Dec.	135,153	11,480	24,866	4,346	175,845
1954:					
Jan.	138,692	13,065	24,733	4,349	180,839
Feb.	143,202	12,518	23,573	4,112	183,405
Mar.	145,178	12,575	22,329	4,202	184,284
Apr.	136,446	12,665	21,673	4,199	174,983
May	131,604	11,467	20,077	4,435	167,583
June	124,678	10,646	17,534	4,314	157,172
July	128,794	11,570	18,044	4,811	163,219

Source: U. S. Department of Commerce.

Natural and Synthetic Rubber Latex in the United States

(All Quantities in Long Tons)

New Supply

Year	Natural	GR-S	Neoprene	N-Type	Total Synthetic	Grand Total
1942	9,595	.....	210	.....	210	9,805
1943	1,890	194	1,512	.....	1,706	3,596
1944	3,090	6,580	4,683	.....	11,263	14,353
1945	4,768	15,176	7,077	.....	22,253	27,021
1946	8,012	24,810	13,595	.....	38,405	46,417
1947	17,675	22,474	6,089	.....	28,563	46,238
1948	32,630	21,494	5,022	.....	26,516	59,146
1949	29,974	21,357	3,651	.....	25,008	54,982
1950	54,401	31,339	5,725	.....	37,064	91,465
1951	54,963	32,972	6,866	2,948	42,786	97,749
1952	48,228	42,273	7,598	4,164	54,035	102,263
1953	75,511	48,112	9,026	5,844	62,982	138,493
1953:						
July	6,691	3,997	571	466	5,034	11,725
Aug.	6,649	3,149	753	633	4,535	11,184
Sept.	6,127	3,518	778	582	4,878	11,005
Oct.	6,537	3,654	753	733	5,140	11,677
Nov.	4,826	3,715	754	352	4,821	9,647
Dec.	7,168	3,900	636	490	5,026	17,220
1954:						
Jan.	5,396	4,089	592	471	5,152	10,548
Feb.	5,681	3,928	742	375	5,045	10,726
Mar.	5,682	4,142	709	483	5,324	11,006
Apr.	5,663	4,046	803	461	5,310	10,973
May	3,806	3,838	680	623	5,141	8,947
June	6,590	4,019	620	585	5,224	11,814
July	.....	2,589	448	643	3,680	.....

Consumption[1]

1942	9,392	.....	200	....	200	9,592
1943	9,578	150	1,400	....	1,550	11,128
1944	6,085	6,000	4,400	....	10,400	16,485
1945	3,886	14,500	6,800	....	21,300	25,186
1946	5,714	23,500	13,000	....	36,500	42,214
1947	13,909	22,500	6,500	....	29,000	42,909
1948	28,489	21,500	5,250	....	26,750	55,239
1949	36,117	21,500	3,750	....	25,250	61,367
1950	56,138	31,000	5,500	....	36,500	92,638
1951	46,750	31,031	6,279	2,628	39,938	86,688
1952	53,567	40,562	7,368	3,093	51,023	104,590
1953	67,375	46,473	7,981	3,654	58,108	125,483
1953:						
July	5,100	3,750	554	298	4,602	9,702
Aug.	5,203	3,576	670	343	4,641	9,832
Sept.	5,504	3,599	678	166	4,443	9,947
Oct.	5,897	3,719	660	312	4,563	10,460
Nov.	5,234	3,510	553	244	4,307	9,541
Dec.	5,395	3,475	574	277	4,344	9,739
1954:						
Jan.	5,882	3,475	615	275	4,365	10,247
Feb.	5,595	3,568	575	250	4,393	9,988
Mar.	6,610	3,982	729	335	5,046	11,656
Apr.	5,892	3,748	603	324	4,675	10,567
May	5,969	3,394	586	348	4,328	10,297
June	5,884	3,653	629	402	4,684	10,568
July	4,179	2,552	428	317	3,297	7,476

Stocks at End of Period

1942	13,450	....	....	....	....	13,450
1943	5,638	....	....	....	....	5,638
1944	2,443	....	....	....	....	2,443
1945	3,121	....	....	....	....	3,121
1946	4,865	....	....	....	....	4,865
1947	5,033	....	....	....	....	5,033
1948	11,235	....	....	....	....	11,235
1949	5,063	....	....	....	....	5,063
1950	4,927	....	....	....	....	4,927
1951	4,752	3,727	1,245	532	5,504	10,256
1952	6,201	5,040	1,019	902	6,961	13,162
1953	13,532	4,794	1,117	721	6,632	20,164
1953:						
July	9,256	5,861	1,162	514	7,537	16,793
Aug.	10,273	5,081	1,127	617	6,946	17,992
Sept.	11,370	4,794	1,122	638	6,554	17,924
Oct.	11,126	4,990	1,133	737	6,860	17,986
Nov.	10,834	4,533	1,064	743	6,340	17,174
Dec.	13,532	4,794	1,117	721	6,632	20,164
1954:						
Jan.	12,375	5,001	1,019	703	6,723	19,098
Feb.	12,963	5,269	963	625	6,857	19,820
Mar.	11,870	5,247	975	588	6,810	18,680
Apr.	10,803	5,273	1,062	600	6,935	17,738
May	8,907	5,180	1,110	655	6,945	15,852
June	9,460	5,591	1,020	646	7,257	16,717
July	10,079	5,536	990	807	7,333	17,412

Source: U. S. Department of Commerce.
Note: (1) GR-S and Neoprene consumption estimated through 1950.

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100 lb. 1/10 Toledo Scale Range
Table 36″ x 72″—up to 6″ thick stock
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HEmlock 4-2188
MEMBER — COMMODITY EXCHANGE, Inc.

Coumarone Resins — Reclaiming Oils — Plasticizers
Powdered Rubber

Rubber Industry Employment Earnings and Hours

All Rubber Products

Mo.	1953 Production Workers (thousands)	1953 Average Weekly Earnings	1953 Average Weekly Hours	1953 Average Hourly Earnings	1954 Production Workers (thousands)	1954 Average Weekly Earnings	1954 Average Weekly Hours	1954 Average Hourly Earnings
Jan.	219.2	$78.09	41.1	$1.90	205.7	75.08	38.7	1.94
Feb.	219.2	79.30	41.3	1.92	202.9	75.47	38.9	1.94
Mar.	220.5	80.29	41.6	1.93	199.4	74.31	38.5	1.93
Apr.	226.3	79.32	41.1	1.93	195.2	75.08	38.7	1.94
May	226.2	78.59	40.3	1.95	196.7	77.42	39.5	1.96
June	226.5	78.55	40.7	1.93	199.2	....	....	....
July	219.3	78.98	40.5	1.95	....	..	....	....
Aug.	220.7	77.21	39.8	1.94	....	..	....	....
Sept.	220.6	74.88	39.0	1.92	....	..	....	....
Oct.	215.6	75.07	39.1	1.92	....	..	....	....
Nov.	210.0	75.65	39.4	1.92	....	..	....	....
Dec.	208.7	75.66	39.2	1.93	....	..	....	....
Tires and Tubes								
Jan.	91.5	89.24	40.2	2.22	86.4	82.88	37.5	2.21
Feb.	91.2	91.80	40.8	2.25	85.3	83.03	37.4	2.22
Mar.	91.6	93.83	41.7	2.25	84.7	80.89	36.6	2.21
Apr.	95.6	91.58	40.7	2.25	83.2	84.14	37.9	2.22
May	96.2	91.30	40.4	2.26	84.4	88.43	39.3	2.25
June	96.0	89.20	40.0	2.23	....	..	....	....
July	93.7	90.45	40.2	2.25	....	..	....	....
Aug.	93.3	87.58	39.1	2.24	....	..	....	....
Sept.	93.4	83.54	37.8	2.21	....	..	....	....
Oct.	90.3	83.16	37.8	2.20	....	..	....	....
Nov.	87.3	85.09	38.5	2.21	....	..	....	....
Dec.	86.7	82.43	37.3	2.21	....	..	....	....
Rubber Footwear								
Jan.	24.5	64.96	40.1	1.62	21.5	62.98	38.4	1.64
Feb.	24.2	67.57	41.2	1.64	20.5	65.57	39.5	1.66
Mar.	24.2	67.57	41.2	1.64	19.6	65.51	39.7	1.65
Apr.	23.8	67.82	41.1	1.65	19.2	63.58	38.3	1.66
May	23.3	60.31	37.0	1.63	19.8	65.46	39.2	1.67
June	23.5	68.06	41.0	1.66	....	..	....	....
July	22.5	68.64	41.1	1.67	....	..	....	....
Aug.	23.6	65.53	40.2	1.63	....	..	....	....
Sept.	24.1	64.24	39.9	1.61	....	..	....	....
Oct.	24.0	62.86	38.8	1.62	....	..	....	....
Nov.	23.7	63.57	39.0	1.63	....	..	....	....
Dec.	22.9	65.44	39.9	1.64	....	..	....	....
All Other Rubber Products								
Jan.	103.2	71.74	42.2	1.70	97.8	70.62	39.9	1.77
Feb.	103.8	71.06	41.8	1.70	97.1	70.40	40.0	1.76
Mar.	104.7	71.72	41.7	1.72	95.1	70.22	39.9	1.76
Apr.	106.9	71.21	41.4	1.72	92.8	69.30	39.6	1.75
May	106.7	70.93	41.0	1.73	92.5	70.05	39.8	1.76
June	107.0	71.28	41.2	1.73	....	..	....	....
July	103.1	70.64	40.6	1.74	....	..	....	....
Aug.	103.8	70.30	40.4	1.74	....	..	....	....
Sept.	103.1	69.65	39.8	1.75	....	..	....	....
Oct.	101.3	70.70	40.4	1.75	....	..	....	....
Nov.	99.0	70.53	40.3	1.75	....	..	....	....
Dec.	99.1	72.45	40.7	1.78	....	..	....	....

Source: U. S. Department of Labor.
Note: Data are based upon reports from cooperating establishments covering both full and part-time employees who work during, or received pay for, any part of the pay period ending nearest the 15th of the month. These employment series have been adjusted to first quarter 1951 benchmark levels indicated by data from government social insurance programs. Hours and earnings data pertain only to production and related workers.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1947	1948	1949	1950	1951	1952	1953	1954
Jan.	32.58	36.09	33.37	31.89	45.04	42.96	33.24	34.15
Feb.	33.91	33.63	33.41	32.79	(a)	41.64	33.76	35.00
Mar.	35.89	35.04	33.44	32.65	46.06	41.70	34.10	35.23
Apr.	35.89	38.10	33.84	33.23	46.06	41.79	33.85	35.22
May	36.51	38.57	33.73	33.64	46.06	39.68	34.30	35.34
June	37.83	38.12	33.56	34.61	46.06	41.31	34.11	35.17
July	38.03	34.89	32.99	38.11	46.21	40.37	34.20	35.37
Aug.	34.83	32.23	32.06	38.93	35.93	40.42	33.82	35.19
Sept.	32.21	31.92	30.94	41.62	36.20	39.75	33.69	....
Oct.	32.39	32.01	30.32	40.66	38.13	37.52	33.53	....
Nov.	34.50	32.15	30.52	43.11	42.70	35.59	33.60	....
Dec.	36.74	32.90	31.08	42.37	43.32	33.76	33.52	....
Average for Year	35.11	34.64	32.44	37.05	42.43	39.71	33.81	....

Note: The Government established a ceiling price of 45.76c for spot cotton on March 3, 1951. (a) Trading suspended during February.

Production Index for the Rubber Industry

(1947-1949 = 100)

(Based on man-hours)

	1952	1953	1954		1952	1953	1954
Jan.	116	132	114	July	92	114	....
Feb.	119	140	114	Aug.	109	122	....
Mar.	120	143	118	Sept.	118	122	....
Apr.	114	140	115	Oct.	131	127	....
May	111	137	118	Nov.	129	120	....
June	115	131	121	Dec.	123	111	....

Sales by the Rubber Industry

(in Millions of Dollars*)

	1952	1953	1954		1952	1953	1954
Jan.	408	424	348	July	377	448	....
Feb.	402	435	351	Aug.	388	409	....
Mar.	400	473	388	Sept.	427	416	....
Apr.	407	444	375	Oct.	423	395	....
May	402	422	357	Nov.	383	346	....
June	409	436	....	Dec.	418	369	....

Rubber Manufacturers' Inventories

(in Millions of Dollars*)

	1952	1953	1954		1952	1953	1954
Jan.	809	866	844	July	890	925	....
Feb.	842	868	857	Aug.	877	897	....
Mar.	857	880	849	Sept.	871	908	....
Apr.	850	874	812	Oct.	866	881	....
May	855	888	810	Nov.	850	867	....
June	851	914	....	Dec.	877	868	....

Source: U. S. Department of Commerce.
Notes: * Adjusted for seasonal variation.

No. 1 R.S.S.—Annual Average Prices

(New York Market—Cents per Pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1912	140	108	121.60	1933	9¾	2⅞	5.96
1913	113	59	82.04	1934	15⅞	8¾	12.92
1914	93	56	65.33	1935	13¾	10½	12.37
1915	79	58½	65.85	1936	23	13½	16.41
1916	102	55	72.50	1937	26¾	14	19.39
1917	90	52	72.23	1938	17⅞	10¼	14.64
1918	70	40	60.15	1939	24	14⅛	17.57
1919	57	38½	48.70	1940	24	18¼	20.10
1920	56½	16	36.30	1941	24⅞	19⅛	22.40
1921	21¼	11½	16.36	1942	22½	22½	22.50
1922	28⅜	13⅝	17.50	1943	22½	22½	22.50
1923	37⅛	24¾	29.45	1944	22½	22½	22.50
1924	40⅛	17⅝	26.20	1945	22½	22½	22.50
1925	121	34⅜	72.46	1946	22½	22½	22.50
1926	88½	36¾	48.50	1947	25	14	20.00
1927	41¾	33	37.72	1948	25	18	21.99
1928	41¼	17	22.48	1949	19¾	15⅞	17.57
1929	26⅞	15½	20.55	1950	86	18	41.10
1930	16½	7½	11.98	1951	76	52	(a)
1931	8⅝	4¼	6.17	1952*	33	26½	29.15
1932	4¾	2½	3.49	1953	31⅞	19⅞	24.21

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947. (a) Free trading suspended March 31, 1951. GSA selling price ranged between 52 and 66c during balance of year. * Free trading was resumed on July 1, 1952; figures represent only July through December, 1952.

No. 1 R.S.S.—Monthly Average Prices

(New York Market—Cents per pound)

	1947	1948	1949	1950	1951	1952	1953	1954
Jan.	22.50 (b)	21.83	19.23	18.33	71.21	....	29.40	20.22
Feb.	25.75 (b)	20.42	18.49	19.40	73.61	....	27.57	19.98
Mar.	25.75 (b)	20.33	19.08	19.86	72.05	....	26.59	20.16
Apr.	25.75 (b)	22.87	18.53	23.51	....	....	24.66	22.06
May	21.04	23.39	17.92	28.07	....	....	25.52	21.96
June	16.29	22.80	16.36	30.92	....	....	24.42	23.01
July	15.48	24.24	16.45	39.10	....	30.52	23.64	24.12
Aug.	15.23	23.63	16.60	51.63	....	29.36	23.36	23.26
Sept.	16.55	22.81	17.58	55.98	....	27.42	23.06	....
Oct.	20.38	22.13	16.31	62.19	....	27.06	20.82	....
Nov.	23.57	20.52	16.70	73.05	....	29.25	20.58	....
Dec.	21.45	18.86	17.53	71.20	....	31.26	20.92	....
Average for Year	20.00	21.99	17.57	41.10	(a)	29.15	24.21	....

Notes: (a) Free trading suspended March 31, 1951, and resumed on July 1, 1952. (b) Price fixed by Government.

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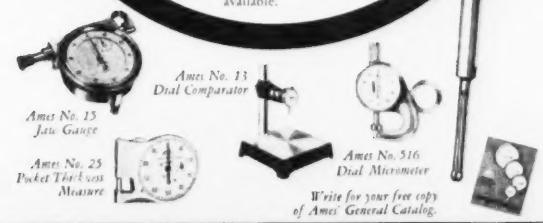

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Automotive Pneumatic Casings

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1943 (total)	6,128	18,547	225	24,900	20,423	1,883
Passenger Car.	82	10,606	71	10,759	7,620	1,132
Truck and Bus	6,046	7,941	154	14,141	12,803	751
1944 (total)	6,654	26,439	263	33,356	33,446	2,013
Passenger Car.	208	18,330	130	18,668	18,819	1,218
Truck and Bus	6,446	8,109	133	14,688	14,627	795
1945 (total)	5,984	36,479	504	42,967	44,524	3,077
Passenger Car.	1,115	25,463	222	26,800	28,200	2,214
Truck and Bus	4,869	11,016	282	16,167	16,324	863
1946 (total)	15,310	65,490	1,512	82,312	82,298	2,448
Passenger Car.	11,086	54,684	653	66,423	66,466	1,763
Truck and Bus	4,224	10,806	859	15,889	15,832	685
1947 (total)	25,056	62,871	3,256	91,183	95,550	6,949
Passenger Car.	19,644	52,857	1,608	74,109	77,795	5,444
Truck and Bus	5,412	10,014	1,648	17,074	17,755	1,505
1948 (total)	26,845	49,148	1,787	77,781	81,314	10,698
Passenger Car.	21,589	41,295	656	63,540	66,738	8,773
Truck and Bus	5,256	7,853	1,132	14,241	14,576	1,925
1949 (total)	31,584	43,466	1,467	76,517	76,369	10,638
Passenger Car.	28,129	36,440	509	65,077	65,140	8,904
Truck and Bus	3,456	7,026	958	11,440	11,228	1,734
1950 (total)	41,349	56,808	1,430	99,587	92,754	3,794
Passenger Car	36,678	47,103	642	84,423	78,598	3,050
Truck and Bus	4,671	9,705	788	15,164	14,156	743
1951 (total)	32,153	44,612	1,677	78,442	83,405	8,765
Passenger Car	26,729	34,226	723	61,678	65,546	6,973
Truck and Bus	5,424	10,386	954	16,764	17,859	1,791
1952 (total) ..	29,484	54,342	1,520	85,346	90,411	14,110
Passenger Car.	24,106	45,458	741	70,305	74,341	11,251
Truck and Bus	5,378	8,884	779	15,041	16,070	2,859
1953 (total)	37,949	55,124	1,543	94,617	96,150	15,720
Passenger Car.	33,106	45,798	809	79,713	81,455	13,044
Truck and Bus	4,843	9,326	734	14,904	14,696	2,676
1953:						
Aug. (total)	3,130	5,523	145	8,798	7,416	13,550
Passenger Car.	2,757	4,649	87	7,493	6,406	10,684
Truck and Bus	372	874	58	1,304	1,010	2,866
Sept. (total) ..	2,837	4,437	149	7,424	7,148	13,287
Passenger Car.	2,503	3,691	84	6,278	6,082	10,494
Truck and Bus	334	747	65	1,146	1,067	2,793
Oct. (total)	3,155	4,246	172	7,573	7,664	13,446
Passenger Car.	2,832	3,212	90	6,135	6,529	10,941
Truck and Bus	323	1,034	82	1,438	1,135	2,505
Nov. (total)	2,221	2,730	135	5,085	6,565	14,852
Passenger Car.	1,875	2,185	75	4,134	5,531	12,284
Truck and Bus	346	545	60	951	1,034	2,568
Dec. (total)	2,620	2,903	143	5,667	6,481	15,720
Passenger Car.	2,263	2,340	76	4,679	5,406	13,044
Truck and Bus	357	563	67	988	1,075	2,676
1954:						
Jan. (total)	2,891	3,993	118	7,002	6,299	14,977
Passenger Car.	2,549	3,378	59	5,986	5,251	12,279
Truck and Bus	342	615	59	1,016	1,048	2,698
Feb. (total)	2,634	3,557	117	6,308	7,042	15,709
Passenger Car.	2,323	3,001	60	5,384	5,952	12,832
Truck and Bus	311	556	57	924	1,089	2,877
Mar. (total)	3,163	4,350	116	7,629	7,981	16,077
Passenger Car	2,809	3,753	45	6,607	6,878	13,112
Truck and Bus	354	597	71	1,022	1,103	2,966
Apr. (total)	3,131	4,935	176	8,243	8,065	15,906
Passenger Car	2,785	4,328	95	7,208	7,031	12,955
Truck and Bus	346	607	81	1,035	1,034	2,951
May (total)	3,620	5,115	184	8,319	7,965	15,504
Passenger Car.	2,695	4,503	101	7,300	6,985	12,575
Truck and Bus	324	612	83	1,020	980	2,928
June (total)	2,890	6,029	160	9,079	8,796	15,218
Passenger Car.	2,587	5,326	89	8,002	7,755	12,323
Truck and Bus	303	703	71	1,076	1,041	2,895

Source: The Rubber Manufacturers Association, Inc.

Rim Production

	1949	1950	1951	1952	1953
Passenger Car	27,715,344	35,096,404	29,145,367	24,936,844	31,318,461
Truck & Bus	4,238,174	6,625,129	6,877,419	5,752,674	5,228,321
Agricultural	2,695,430	2,853,483	3,019,581	2,073,116	1,943,487
Earth Mover	9,895	15,602	28,026	31,791	24,685
Total	34,658,843	44,590,618	39,070,393	32,794,425	38,514,954

	1954					
	Feb.	Mar.	Apr.	May	June	July
Passenger Car	1,968,868	2,601,710	2,336,375	2,297,021	2,339,894	1,651,127
Truck & Bus	338,416	416,802	412,640	420,449	389,065	228,013
Agricultural	152,293	153,938	141,358	104,504	117,523	82,385
Earth Mover	1,472	1,819	2,498	2,890	2,206	472
Total	2,461,049	3,174,269	2,892,871	2,824,864	2,848,688	1,961,997

Source: The Tire & Rim Association, Inc.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1934	2,177,919	575,192	2,753,111	1944	0	124,819	124,819
1935	3,252,244	694,690	3,946,934	1945	83,792	313,643	397,435
1936	3,669,528	781,862	4,451,390	1946	2,148,699	930,760	3,079,459
1937	3,915,889	892,382	4,808,271	1947	3,558,178	1,220,634	4,778,812
1938	2,000,985	485,852	2,486,837	1948	3,909,270	1,363,856	5,273,126
1939	2,866,796	704,308	3,571,104	1949	5,108,841	1,123,736	6,232,577
1940	3,692,328	721,637	4,413,965	1950	6,665,836	1,332,263	7,998,099
1941	3,744,500	875,381	4,619,681	1951	5,337,729	1,420,432	6,758,161
1942	220,814	133,083	353,897	1952	4,320,794	1,212,790	5,533,584
1943	0	4,501	4,501	1953	6,121,787	1,202,196	7,323,983
1953:							
Jan.	453,319	111,599	564,918	July	599,134	105,622	704,756
Feb.	486,071	96,740	582,811	Aug.	513,457	101,478	614,935
Mar.	566,320	134,129	700,449	Sept.	475,289	98,051	573,340
Apr.	596,633	126,754	723,387	Oct.	528,088	91,955	620,043
May	549,677	93,443	643,120	Nov.	378,406	73,710	452,116
June	587,549	74,063	661,612	Dec.	387,844	94,652	482,496
1954:							
Jan.	454,562	96,167	550,729	July	151,663	78,507	530,170
Feb.	446,676	87,141	533,817	Aug.	.....	.....	.....
Mar.	531,529	101,177	632,706	Sept.	.....	.....	.....
Apr.	534,667	96,723	631,390	Oct.	.....	.....	.....
May	497,062	91,226	588,288	Nov.	.....	.....	.....
June	507,055	91,470	598,525	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.
Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
Year	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1942	6,895	7,213	159	14,267	12,685	6,206
1943	6,350	12,474	189	19,014	15,014	2,626
1944	6,460	20,569	196	27,224	27,488	2,813
1945	5,988	33,906	411	40,304	41,742	3,627
1946	15,327	59,357	1,424	76,108	77,251	3,820
1947	25,046	46,560	2,483	74,088	79,181	8,059
1948	26,833	40,548	1,119	68,499	70,033	9,641
1949	31,521	31,450	887	63,858	65,114	10,657
1950	41,240	42,671	811	84,723	80,179	..
1951	32,151	32,284	1,071	65,507	67,249	10,094
1952	29,451	32,985	1,014	63,449	65,073	12,036
1953	37,957	36,072	878	74,907	74,425	11,874
1953:						
Sept.	2,841	2,768	111	5,720	5,656	11,288
Oct.	3,156	2,696	107	5,960	5,752	10,904
Nov.	2,222	1,708	76	4,006	4,738	11,611
Dec.	2,620	1,917	87	4,625	4,533	11,564
1954:						
Jan.	2,884	3,892	58	6,834	5,395	10,107
Feb.	2,636	2,908	74	5,617	5,896	10,448
Mar.	3,165	2,774	74	6,013	6,399	10,869
Apr.	3,134	2,770	97	6,001	6,266	11,234
May	3,017	2,900	84	6,002	5,909	11,170
June	2,889	3,657	85	6,631	5,739	10,379

Source: The Rubber Manufacturers Association, Inc.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1947	1948	1949	1950	1951	1952	1953	1954
Jan.	57,057	61,308	63,125	66,981	80,670	86,863	89,634	89,852
Feb.	50,551	56,487	57,980	53,274	72,864	82,043	86,458	86,206
Mar.	59,947	68,171	73,282	78,780	86,962	87,065	98,158	101,549
Apr.	64,140	72,183	75,318	80,350	87,573	98,653	102,044	103,866
May	70,865	77,186	81,665	89,035	100,266	101,137	105,918	104,418
June	71,329	78,044	83,374	90,174	96,364	99,305	114,703	.....
July	73,441	81,428	83,129	91,677	100,567	105,307	112,960	.....
Aug.	72,089	80,351	84,707	94,507	101,453	102,954	109,124	.....
Sept.	71,384	76,159	80,832	86,725	91,891	100,095	106,158	.....
Oct.	73,277	75,164	79,327	89,067	100,209	103,689	106,037	.....
Nov.	64,158	72,560	76,346	82,688	88,581	91,326	99,210	.....
Dec.	67,506	72,162	75,628	81,032	84,551	95,817	100,225	.....
Total	795,015	871,270	913,713	994,290	1,091,951	1,154,254	1,230,629	.....

Source: U. S. Bureau of Mines.

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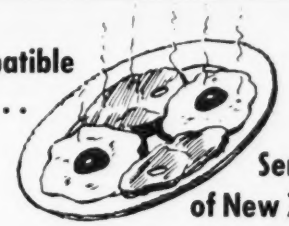

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Various Compounding Materials Consumed by the Rubber Industry

Material	1947	1948	1949	1950	1951	1952	1953
Antimony, Primary:							
Short tons	39	41	55	103[c]	19[c]	66	.....
% of total	.002	.003	.005	.007	.001	.005	.....
Asphalt: [a]							
Short tons	32,113	19,967	18,050	26,819	21,414	33,288	.....
% of total	0.7	0.4	0.3	0.3	0.3	0.4	.....
Barite (Barytes):							
Short tons	17,000	18,000	14,000	19,000	15,000	14,000	.....
% of total	3.1	2.85	2.53	3.31	2.13	2.0	.....
Carbon Black:							
Short tons	471,790	435,282	383,565	515,184	530,614	537,273	566,797
% of total	94.3	95.5	93.3	92.9	93.9	93.1	94.4
Clay, Kaolin:							
Short tons	166,201	176,965	197,341	263,306	231,331	240,982	.....
% of total	11.5	11.3	13.1	15.0	12.7	13.2	.....
Clay, Fire & Stoneware:							
Short tons	17,970	15,480	27,148	9,500	.....	9,322	.....
% of total	0.2	0.2	0.3	0.1	.....	0.1	.....
Lime:							
Short tons	589	1,154	715	908	1,126	2,000	.....
% of total	0.01	0.02	.0002	.0002	(d)	(d)	.....
Litharge:							
Short tons	2,205	2,835	1,398	3,047	2,641	2,109	.....
% of total	1.3	1 8	1.2	1.7	1.7	1.5	.....
Lithopone:							
Short tons	3,085	4,192	3,245	4,092	3,295	1,523	.....
% of total	1.9	3.0	4.1	3 9	3.2	2.5	.....
Mica, Ground:							
Short tons	3,900	4,372	3,856	5,776	6,551	5,126	.....
% of total	6.0	7.0	7.0	8.0	9.0	7.0	.....
Sulfur:							
Short tons	72,800	70,560	59,360	75,000	75,000	75,000	.....
% of total	1.8	1.7	1.5	1.3	1.6	1.6	.....
Talc: [b]							
Short tons	71,840	66,226	53,400	75,900	70,970	64,476	.....
% of total	13.9	13.0	12.0	12.0	11.2	10.9	.....
Zinc Oxide:							
Short tons	82,248	82,895	58,496	82,944	71,507	72,774	.....
% of total	51.2	54.9	52.5	51.6	48.4	51.2	.....

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes prophyllite and ground soapstone. (c) Does not include precipitated antimony sulfide as in previous years. (d) Negligible.

Reclaimed Rubber

(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	Production	Consumption: Tons	Consumption: % to Crude [a]	Exports	Stocks On Hand at End of Period
1937	185,033	162,000	29.8	13,233	28,800
1938	122,400	120,800	27.6	7,403	23,000
1939	186,000	170,000	28.7	12,611	25,250
1940	208,971	190,244	29.3	11,347	32,636
1941	274,202	251,231	32.2	13,851	41,750
1942	286,007 [b]	254,820	64.6	30,405	42,532
1943	304,058 [c]	291,082	59.6	15,678	46,201
1944	260,631 [d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1947	291,395	288,395	24.8	14,556	35,943
1948	266,861	261,113	24.4	11,428	32,630
1949	224,029	226,679	22.5	10,637	28,263
1950	314,008	303,733	24.1	11,740	35,708
1951	366,700	346,121	28.6	14,722	45,082
1952	274,981	280,002	22.2	11,180	30,664
1953	298,336	285,050	21.3	11,597	32,319
1953:					
Sept.	23,469	22,409	21.6	894	30,147
Oct.	23,649	21,944	20.8	823	30,692
Nov.	21,323	19,638	20.5	1,086	31,226
Dec.	21,463	18,858	20.2	1,031	32,319
1954:					
Jan.	20,026	19,114	19.7	912	31,865
Feb.	21,122	19,461	20.3	941	32,393
Mar.	23,383	22,882	20.8	830	32,148
Apr.	21,658	21,883	20.8	1,050	31,359
May	21,316	20,536	19.7	1,071	31,105
June	22,342	22,321	20.0	1,068	30,845
July	17,997	16 214	20.5	1,070	31,910

Source: U. S. Department of Commerce.
Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (a) Includes natural and synthetic rubber. (b) Includes 893 tons of imports. (c) Includes 67 tons of imports. (d) Includes 21 tons of imports.

Cotton, Rayon and Nylon Tire Fabrics

(Production in Thousands of Pounds)

	Cotton: Tire Cord Not Woven	Cotton: Cord Fabric Woven	Cotton: Chafer and All Other Tire Fabrics	Cotton: Total	Rayon and Nylon [b]: Tire Cord not Woven	Rayon and Nylon [b]: Tire Cord and Other Tire Fabrics	Rayon and Nylon [b]: Total
1951:							
Jan.-Mar.	11,497	38,269	16,737	66,503	11,878	65,512	77,390
Apr.-June	12,608	42,491	17,055	72,154	11,979	61,957	73,936
July-Sept.	16,744	44,340	17,433	78,517	12,091	67,982	80,073
Oct.-Dec.	14,237	43,820	13,899	71,956	a	83,354	83,354
Total	55,116	168,920	65,124	289,160	35.948	278,805	314,753
1952:							
Jan.-Mar.	11,226	36,378	12,971	60,575	14,434	72,249	86,683
Apr.-June	4,661	24,612	10,742	40,015	16,874	81,249	98,123
July-Sept.	335	9,257	9,460	19,052	18,128	80,355	98,483
Oct.-Dec.	c	4,728a	11,580	16,308	19,436	81,171	100,607
Total*	15,887	74,834	48,280	139,001	68,873	323,106	391,979
1953:							
Jan.-Mar.	c	4,378a	15,477	19,855	20,487	91,742	112,229
Apr.-June	c	5,713a	15,880	21,593	18,906	95,711	114,617
July-Sept.	c	3,562a	13,193	16,755	18,597	89,821	108,418
Oct.-Dec.	c	2,460	11,569	14,029	19,664	79,259	98,293
Total*	c	16,113	57,103	73,216	77,654	370,137	447,791
1954:							
Jan.-Mar.	c	2,585	13,229	15,814	17,297	78,388	95,685
Apr.-June	.....	.....	.....	.....	.....	.....	.....
July-Sept.	.....	.....	.....	.....	.....	.....	.....
Oct.-Dec.	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....

Source: Bureau of the Census, U. S. Department of Commerce.
Notes: (a) Included with tire cord and fabrics to avoid disclosures of operations of individual mills. (b) Fuel cell fabrics are not included with rayon and nylon tire cord and fabrics. (c) Included with tire cord woven. (d) Included with chafer and all other tire fabrics. * Revised.

Consumption of Vinyl Resins

(In Thousands of Pounds)

Year	Sheeting and Film [a]	Textile and Paper Coating Resins	Molding and Extrusion Materials	All Other
1950	227,149	46,044	113,889	21,868
1951	161,547	43,688	134,890	23,934
1952	154,902	42,298	140,872	31,793
1953:				
Jan.	14,830	4,284	15,424	3,076
Feb.	16,516	4,145	13,847	2,919
Mar.	17,575	4,950	14,906	3,683
Apr.	16,574	4,934	15,332	2,800
May	14,766	4,126	13,509	3,084
June	.....	.....	.....	.....
July	.....	.....	.....	.....
Aug.	.....	.....	.....	.....
Sept.	.....	.....	.....	.....
Oct.	.....	.....	.....	.....
Nov.	.....	.....	.....	.....
Dec.	.....	.....	.....	.....

Source: U. S. Tariff Commission.
Note: (a) Includes weight of fillers, plasticizers, extenders and safety-glass sheeting. Beginning January, 1951, statistics are listed on a resin content basis.

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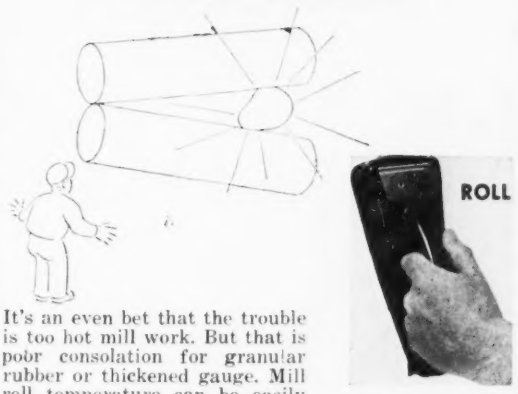

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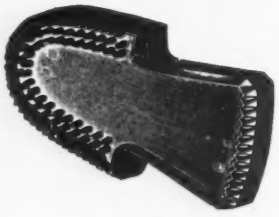

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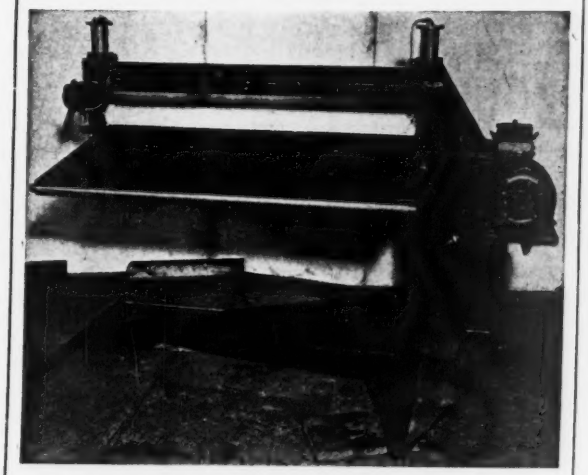

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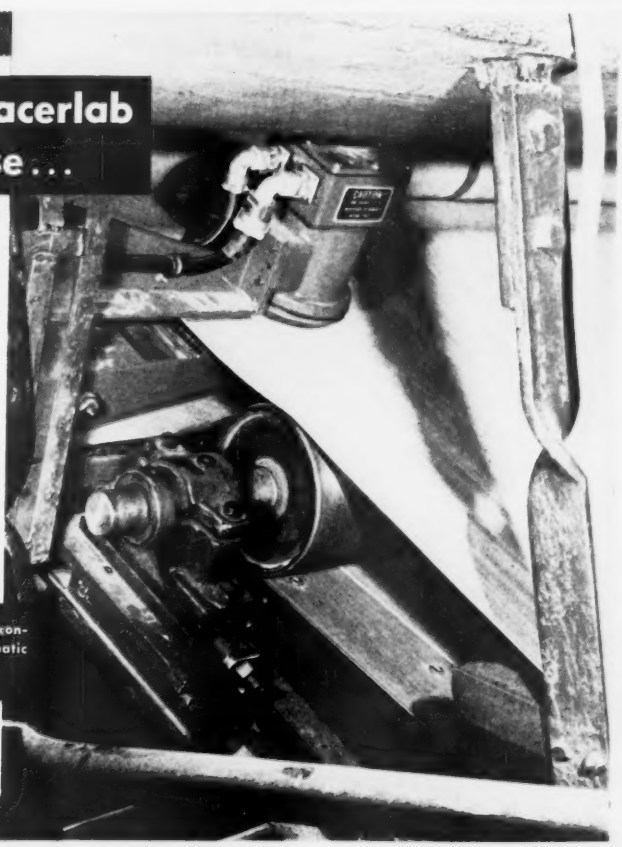

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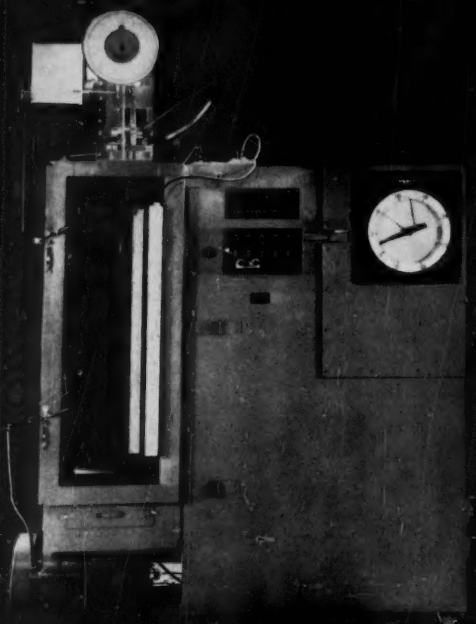

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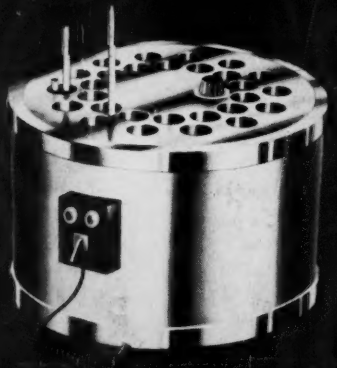

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